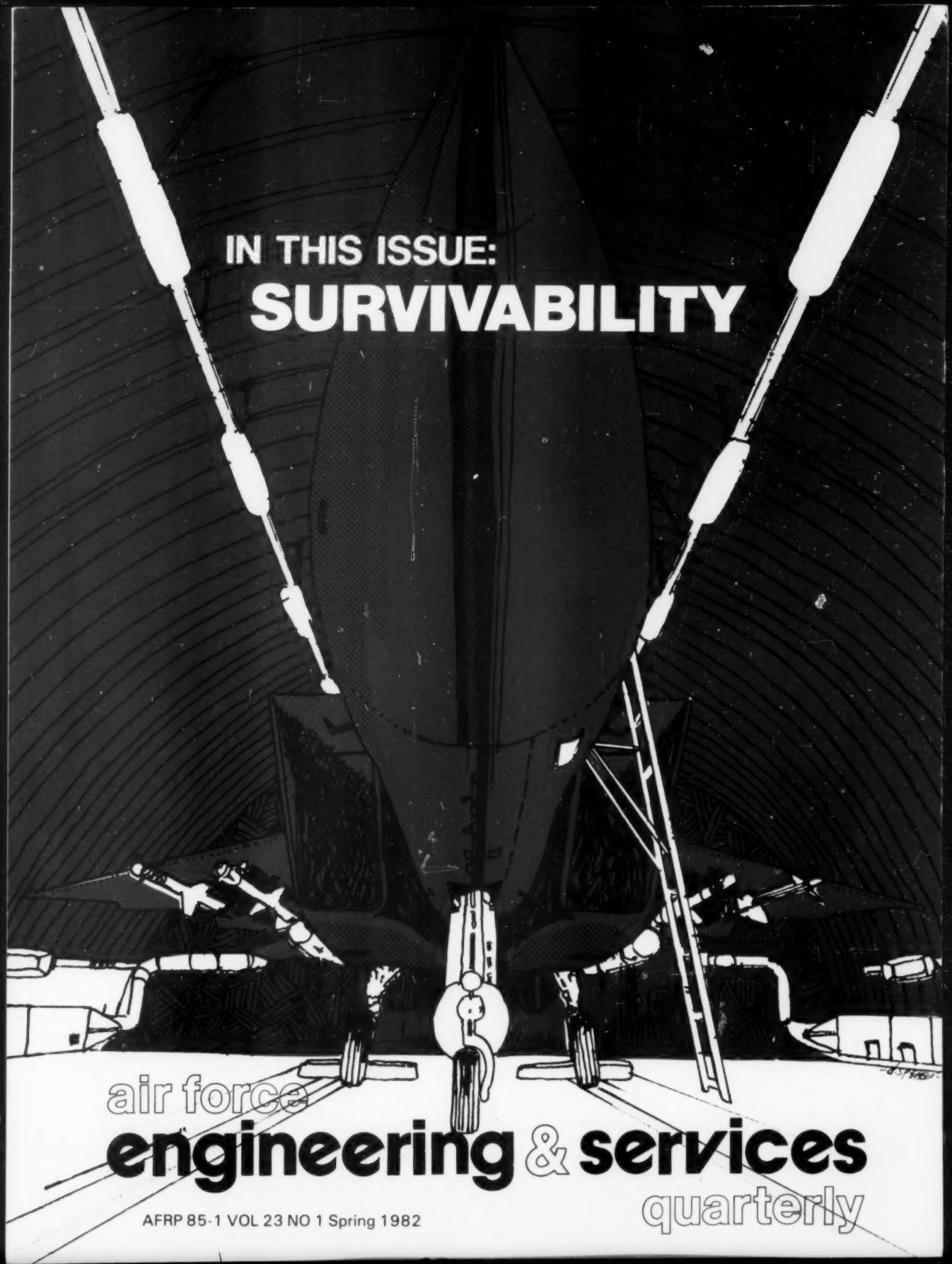


IN THIS ISSUE:

SURVIVABILITY

air force

engineering & services

quarterly

AFRP 85-1 VOL 23 NO 1 Spring 1982

From the Director

In past issues of the ***Quarterly*** we have covered in detail the specific programs through which our Engineering and Services professionals have been enhancing the readiness of American forces.

This issue of the ***Quarterly*** seeks to explore some of the same groundwork from another viewpoint. Can we survive? We have diligently been working toward that goal for some years. However, the question contains two traps.

The first is the sense of false accomplishment. When we first asked what it took to withstand attack on our base facilities, there were myriads of specific needs identified. In the process of assigning priorities and assimilating these needs into the program, many items didn't make the cut. So, when we finish the tasks which did make the program, we assume that we are "ready." In fact, what we have finished is only that which we could with limited resources.

We must be constantly mindful of the total program required to insure our survival. Likewise, we must also be aware of the changing requirements posed by the evolving nature of the enemy threat.

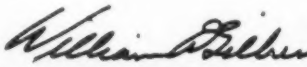
The second trap is one of compartmentalization. If the issue is withstanding enemy attack, we deal with hardening of base facilities, protecting vital supplies and services, recovering our operating surfaces, controlling damage, even working in an environment made threatening through introduction of chemical and biological agents, and under conditions which test human endurance. Thus, when our facilities resemble fortresses, we assume that the issue has been resolved to the limits of our abilities. In truth, the task is not just to survive. The task is to win.

There have been extremely costly assaults on enemy strongholds in our history, particularly during World War II in both the Pacific and in Europe. In time we prevailed. When we were attacked at the outset of World War II, among our fortresses was the tiny island of Corregidor. It was virtually impregnable. Eventually it was surrendered, May 6, 1942, the forces virtually without food and water, having exhausted their ammunition, and not only suffering many casualties but the psychological and physiological stresses of constant bombardment.

Our challenge is not to build fortresses with the retaliatory range of artillery and short-range missiles. Our goal is to survive, recover, and to quickly return the attack to the enemy. Ultimately, we make it possible for the Air Force to fly and fight—even admitting the possibility of our bases being attacked.

As Engineering and Services professionals, we must be constantly mindful that the threat is no less real because we are not fully prepared. The threat is greatest when we are least prepared.

Can we survive? Yes. Can we win? Yes, if we do our job right and aim toward engineering a maximum capability to launch sorties even in the face of an attack. Will we have to fight? We won't if the enemy thinks we can win.



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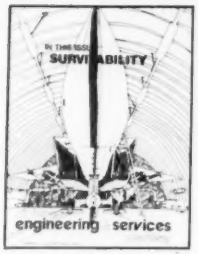
Major General, USAF
Director of Engineering and Services



This issue is dedicated to our Engineering and Services professionals who work for base survival in order that we can win.

engineering & services

Air Force
Engineering and Services
Quarterly

AFRP 85-1 VOL 23 NO 1

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Cover Illustration — Dean Spencer

readiness AS A STATE OF MIND

by Gen Bryce Poe II, USAF (Retired)

Rely not on the likelihood of the enemy not coming, but on our own readiness to receive him; not on the chance of his not attacking, but rather on the fact that we have made our position unassailable.

These words come from the earliest known military work, written in China by Sun Tzu Wu about 500 B.C. It should not be necessary to argue their relevance today. Yet while the importance of this precept may be agreed in principle, individuals or nations seldom act accordingly. This usually results in risk-taking, often on an enormous scale, by people who are otherwise able, patriotic, and responsible.

History, even the recent record of our own nation (perhaps better put "especially" our recent record), is replete with examples. More's the pity that on most occasions the decision maker, in justifying action or inaction, does so in a way that denies any hazard whatsoever. A minor change in an estimate of threat allows deletion of the requirement for combat wings. The reduction of the combat radius of any enemy bomber removes it as a problem for air defenses. Debate as to the ability of industry to respond to increased money for war reserve spare parts is used to cut back those funds "because they really can't spend them all."

Things are a bit better now. At any rate the current administration is trying very hard to reverse the trend of gambling with national security. However, years of neglect, coupled with long lead times and shortages of materials and skills, make progress difficult. The new efforts literally must prevail through years before even reasonable recovery is assured, striving to persist despite continuing resentment, ridicule, and determined opposition.

The average military member, strongly feeling his personal responsibility for readiness, may perceive that he can do little under these circumstances and be justifiably frustrated. While I share that frustration, having experienced full measure myself, the truth is that there is a great deal that can be accomplished. Certainly more than is being done today.

First, each situation can be reported in a positive and absolutely straightforward manner. It is not necessary — in fact it is terribly wrong — to exaggerate or overstate problems. Nevertheless, it is not the military professional's place to help justify risk taking by acquiescing, by agreeing that what is suggested

"really won't be that perilous." Often a firm position will prevail. At any rate, it gives the one who would gamble with our security no cover, no comfort, and no excuse. Few will stand tall and say they are willing to chance national disaster.

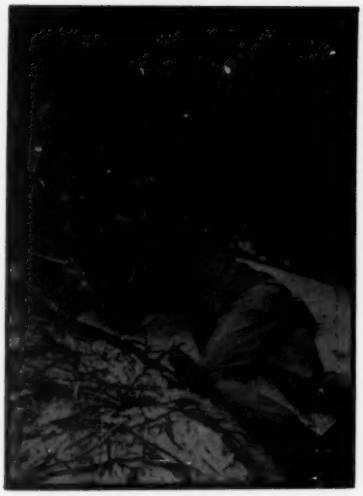
Still, the average military man is not party to this debate. His worries are, or should be, how to handle threats to our security right now, tonight, or at most — if his job is development or acquisition — whether we will bring what is needed on line before what we have now is no longer effective.

What then is his basic role in readiness? What should he do? What can he do?

The first thing to do is to make certain that we understand that all readiness is based on a specific, somewhat unnatural state of mind. It involves contemplating unpleasant consequences, and never giving in to unreasonable optimism or wishful thinking. Above all it means never saying, "What I'm doing may not be entirely satisfactory but it's good enough because it is the best we can do under the circumstances."

Too many military commanders have come to regret "good enough" or "best possible" decisions. Yet that attitude is all too prevalent today. How many times do you hear, "it fell out of the MCP, so there's nothing to do but wait and put it in again next year?" Some critically important items are carried that way for decades, with responsible people smugly insisting that they have done all that is possible. In the meantime, equipment needed to put combat sorties in the air sits naked, unprotected, actually inviting attack.

Another favorite and equally unforgiveable habit is that of assigning responsibility to someone else! That is like two fire departments arguing over jurisdiction while the house burns down. It is probably an unfair analogy since I know of no fire department that would act so irresponsibly. It is a good example, however, because all too many overlapping



bureaucracies make it a way of life. This may be more pervasive in NATO than anywhere else. "Get it in NATO slice XYZ and we won't have to fund it." Or, if on the other side, "That's really a national responsibility." I have no quarrel with this fiscal debate and I can understand it when it comes to barracks, clubs or housing. When it relates to hardening of critical combat support facilities I consider it totally irresponsible. Some items I helped put into a NATO slice as a captain in 1953 were finally constructed when I was a lieutenant general in 1974. If they were required for warfighting, and I believe they were, the only possible conclusion is that we gambled with our security for more than 20 years.

Again, few of us hold cards at that level of play, but almost everyone is in a position to forestall, or at least limit the damage. Fundamental in this case is doing everything possible to make our priorities truly significant and meaningful. Too often they are the product of negotiation and consequently are meaningless.

It is really not that hard. Whether we speak to the obligation of people, money, time, equipment, facilities or whatever, comparative worth for combat air forces is generally easily determined by asking one question, "Will this contribute to bombs-on-target?" If it will not, since those things that will so contribute always lack manpower, funds or any of the rest, we are dead wrong. If we are right, and what we are doing will support our primary job, then we must decide its true precedence.

This may all sound simple and straightforward but it seldom prevails. We seem to live in a world of the collateral, the accessory, and the appendage. Examples come readily to mind. Among them, I remember the screams of outrage when we closed a hotel in Europe, a structure that required over $100,000 a quarter just to repair ancient wiring and plumbing, versus the dead silence when refurbishment of an engine shop was disapproved that same month. My favorite is the week that we were preparing a reclama to a turndown of our request for $1.25 million to match host nation money to open an underground command and control bunker. But we had to stop long enough to brief and work with a team that had come in theater with $10 million to study running a NATO war by satellite from the United States.

How easy choices would be were they applied against our real reason for existence.

So once again, what to do? How does each Air Force member make the maximum contribution to readiness?

The specifics are really up to the individual, to his talent, experience, perceptiveness, and ability to innovate. It would be presumptuous of me, for example, to try and tell the Engineering and Services professionals who read this journal how to protect buildings or prepare to repair runway damage or handle the needs of thousands of dependents being taken to safety. What I would suggest, however, is linking that hard-won talent with a readiness "state-of-mind."

You begin with a priority list of what is necessary to accomplish the combat mission. Modern air operations are complex, with

many interdependent activities. Potential weak links abound not only associated with the combat aircraft themselves but also involving communications centers, power sources, runway/taxiway choke points, computer terminals, test equipment, avionics or engine shops, oxygen supplies, special purpose vehicles, POL, water, munitions assembly setups, and air cargo off-load areas. Loss of any one of these or others could potentially ground the force, or at least greatly reduce effectiveness.

Once the critical elements are identified, they should be surveyed as to their vulnerability. Both identification and survey are never-ending. They can change drastically with a new threat, with aircraft replacement or modification, with new tasking, even with the changes of the weather seasons or politics. It is an endless but always critical necessity. Organizations with non-specific mobility missions, such as those slated for rapid deployment to any of several destinations, have special problems. They need to know, instantly, what to take where and what to do when they get there. This requires constant attention and revision.

From then on the "state-of-mind" becomes paramount. We must move from the negative "Can anything be done?" to the positive "What are we going to do?" Of course we must use the MCP and NATO Infrastructure program and the like. Some tasks are so massive that the large efforts to completely solve them are only possible through such means. But remember, that is to completely solve them. Much can be done in the interim.

Develop the ability to "think war." Look at the items on your priority list and try to visualize problems and solutions. Drive and walk the flight line, dispersal, shop and storage areas.

- "If that culvert is blown how will we move bombs to the line?"
- "What is the alternative to that taxiway?"
- "Could those soft but vital activities operate as well some distance away from the flight line/runway area where we must anticipate collateral damage?"
- "Are we using high value special purpose vehicles where less scarce step vans or pickups would suffice?"
- "Are we living with outstanding backorders when local machine shop manufacture could put the unit back on line?"

In other words, first shake down the requirements to the simplest possible terms. Next provide protection, redundancy and alternatives for what you need in order to fight. Then get to work.

Getting started and keeping moving will be difficult. It has always been so. Vegetius, writing of the Roman military system in 390 A.D., reported that "in the midst of peace, war is looked on as an eventuality too distant to merit consideration." Be the exception, even though you will find yourself in immediate opposition to many a shibboleth. Only a few have the ability to overcome custom, inertia, and that warm, comfortable and pervasive feeling that nothing bad can ever really happen.

One man who was especially successful in overcoming all this was a relatively junior officer at one of our U.K. bases in the mid-1970's. Almost alone he sand-bagged communications facilities, built revetments of earth-filled 55 gallon drums around key maintenance shops, and turned surplus pipe lengths into personnel shelters. More prevalent, unfortunately, is the type represented at that same time by one of our wing commanders who, when asked to follow the example, said, "but the earth-filled 55 gallon drum is really not cost effective, since we'll have to replace it every few years as it rusts out." He was able, bright, and energetic but we had trained out his war-fighting leadership and replaced it with business as usual analytic thinking based on peacetime economics.

One way to gain a readiness attitude is to continually say to yourself, "If I knew we would be attacked tomorrow what would I do today?" If you are in the forward area you should then go ahead and do it — tempering your action only with thoughts of safety and reasonable duty hours. While you must accept that wartime work schedules cannot normally be applied constantly to personnel in peace even in high threat areas you can and must prioritize the work they do. I would suggest, for example, that bulldozers should be unavailable to fill low spots on the golf course so long as a berm has not been pushed up around the avionics intermediate shop that is still years away from MCP hardening.

By setting an example — and engineering projects are often the most visible illustrations — you can often permeate an entire wing with a climate of readiness. Everyone has a stake in the effort and everyone should participate. Sometimes lack of availability of even the most simple equipment causes major difficulties. At Tan Son Nhut, in 1969, we had to send two dozen RF-4C's to sanctuary in Thailand every night for a week due to lack of tugs and warehouse tractors to move them into revetments where they would be safer from rocket attacks.

We could go on endlessly with cautions, examples and advice, and each reader could add his own. In sum, however, it is all very simple. The threat is real. Warning may be minimal. Each day when nothing is done is a day lost forever. As President Lincoln wrote in the dark days of April 1861, "I think the necessity of being ready increases — Look to it." E&S

Gen Bryce Poe II, USAF (retired), is a 1946 graduate of the U.S. Military Academy; attended the Colorado School of Mines and the University of Kansas; holds masters degrees in history from the University of Omaha and in international affairs from George Washington University; and is a graduate of the Armed Forces Staff College and the National War College. Recently retired as commander of Air Force Logistics Command, he also served as vice Commander-in-chief, USAFE and in key assignments in strategic systems.

AIR BASE SURVIVABILITY

by Col Darrell G. Bittle

Any major potential enemy wants to catch us with our guard down, our facilities, weapon systems and launching capabilities unprotected, and be able to quickly knock out our retaliatory mechanisms.

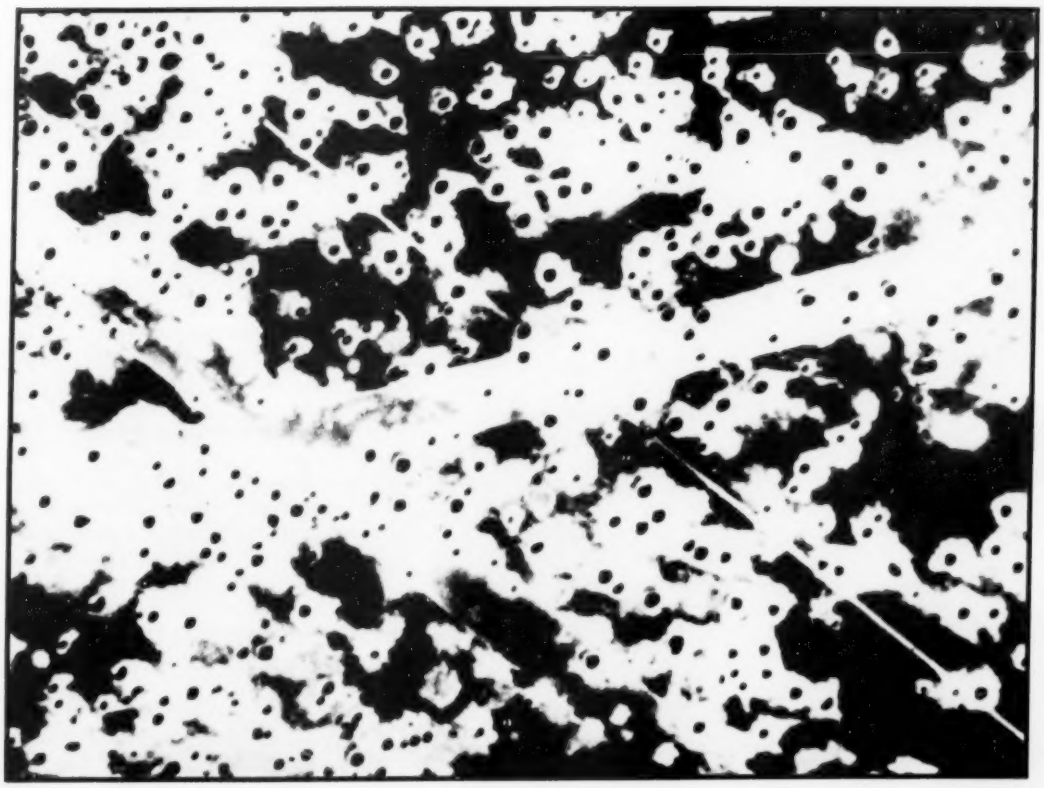
Two decades ago the price obviously was a total devastation of the enemy homeland. As the sophistication of enemy weapons systems has risen, the gross numbers of systems and forces available to the enemy within a given theater have become far more critical to our military planning. Further, we now actively exercise concepts which fall short of total nuclear commitment.

A long term effect of this is to deny us the kind of tactical immunity which we previously assumed. We are now faced far more imminently with the possibility of non-nuclear attack on our tactical bases in overseas theaters while at the same time we must still consider nuclear attack.

Survivability of these bases following attack is related to our national survival. If our weapon systems launching and operating facilities around the world are less vulnerable, if we can protect our bases better, recover faster, and begin sustained sortie generation after an attack, our global credibility as a fighting force increases in the eyes of a potential enemy. This forces him to deal with a magnitude of counterattack which he may not be able to tolerate. This in turn creates a hesitancy to fire the first salvo.

That is why we are actively working to insure maximum sortie generation following an enemy attack. This article will be dealing with exactly that.

In giving you some background on some very recent activities in the air base survivability (ABS) arena, be aware that a great deal of high-level concern has been focused on this vital matter with heightened activity all the way across the Air Force. We will be discussing ABS in the past, changes, and the future of



engineering and services in ABS.

First, outlined below is the purpose of ABS and a good definition of what ABS is:

1. If attacked, reduce the magnitude of the attack.

2. When attacked, minimize the impact on your sortie generation critical activities.

3. Following an attack, recover from that attack in the minimum time.

We have broken it down into five elements:

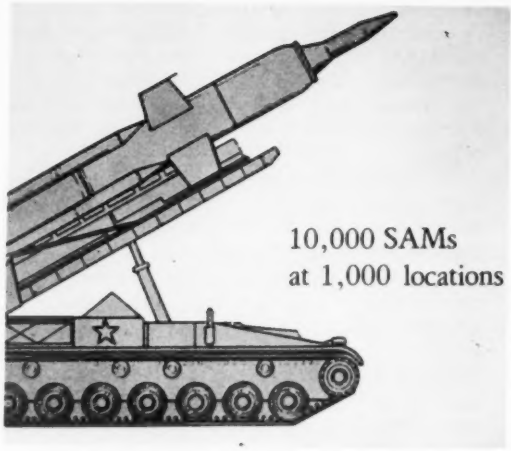
- **Active defense**
- **Passive defense**
- **Recovery**
- **Command, control and communications**
- **Aircraft enhancements and modifications.**

There have been a number of problems. First there has been a lack of a systems approach to solving the problem; there have been voids in all areas of the five elements outlined above; and there has been insufficient funding (partially as a result of no systematic approach); there has been no way to prioritize efforts in the five essential elements mentioned above relative to each other nor within elements; and lastly, there has been no integrated master plan with both long and short term focus towards improvements and enhancements.

Since the mid '60s there have been a number of key studies and assessments conducted which have both focused on the problem as well as recommending corrective action in providing some game plan for improvements. They started as early as 1966 when the theater air base vulnerability or TAB V study was conducted by Brig Gen Gordon Blood. It is really the granddaddy of them all since it provided, at that time, a game plan with POM inputs as specific programs following analytical study. The next major change was as a result of the Headquarters USAF Readiness/ NATO Coordination Board (RCNB) airbase survivability study which was conducted at the Air Staff in 1977. Two key theater studies that were conducted in the late '70s were the USAFE Survivability and Recovery Study of 1977 and a like study on survivability and recovery in the Pacific Air Forces theater.

A box score of our past efforts would look like this, first in the area of deficiencies:

- **First, we find a tremendous lack of sufficient protective structures both for aircraft as well as our people who are engaged in our critical sortie generation activities.**
- **Second, we find that our aircraft sheltering program, while enhancing survivability of our aircraft, could be expected to cause shifts in enemy targeting to runways, taxiways and other aircraft operating surfaces as well as C^3 nodes.**
- **Third, the threat has been increasing substantially both in accuracy and capability of enemy aircraft in all threatened theaters.**
- **Fourth, we find our modern aircraft have a continuing reliance on smooth runways, comparatively long take off and landing distances, and high pressure tires with unforgiving undercarriages.**
- **Fifth, in all theaters our host nation capabilities fall short of the recovery and active defense requirements for arriving theater reinforcement aircraft. For a number of years, the Army has been constrained in the area of active defense by inadequate resources. This seriously limits adequate provision of point air defense for our air bases. The Air Force, in turn, has not provided our own point defense due to**



- First, we have made substantial gains in providing aircraft shelters for our in-place forces in both costs, manpower impact and assignment of that role and mission to the Army.

- Last, and probably the greatest problem, is inadequate funding for goal accomplishment. Particularly in the European theater this is coupled with a Congressional reluctance to provide the substantial funding necessary from U.S. resources.

It is easy to dwell on the negative aspects in this area where so much has yet to be done but let's talk about the "so much" that has already been accomplished:

- In the European theater, the tonedown and dispersal siting work that was started in the mid '60s is substantially underway and being accomplished in a first class manner. Accomplishment of the goals that were established in the TAB V study is well on the way. Top level awareness is probably greater on this topic than at any time in the past 10 years in the Air Force as well as an understanding of the size and complexity of the problem.

- Protective revetments around key sortie generation facilities, started in the mid '70s, is nearing completion in USAFE and is underway in PACAF.

- Lastly, our Rapid Runway Repair and recovery forces are better trained now than they ever have been and we can be proud that they are probably the best trained of any of the Air Force's recovery resources.

From this review of the box score there are some lessons learned:

- First, a continuing organization is needed. We can no longer afford to allow ad hoc response.

- Secondly, there is a need for development of a central core of expertise in the area of air base survivability.

- Third, the past definition of air base survivability needs to be broadened to encompass the five elements shown earlier in the article.

- Last, and tied to the third concern, a broad multi-functional approach is vital. Efforts toward improvement in one area without corresponding increases or balancing increases in the others, we can now see with hindsight, are ineffective and inappropriate.

IT IS MORE EFFECTIVE TO DESTROY THE ENEMY'S AERIAL POWER BY DESTROYING HIS NEST AND EGGS ON THE GROUND THAN TO HUNT HIS FLYING BIRDS IN THE AIR.

GIULIO DOUHET, 1921

Broad Area Review

Some fairly recent significant events are worthy of review. In the late '70s the concerns of senior Air Force leadership were voiced in the theaters as well as at HQ USAF concerning our deficiencies. Air Force Systems Command was tasked to develop some recommendations in mid-1980. They proposed the convening of a broad area review (BAR) with some specific recommendations for change. This BAR was conducted on April 7, 1981 with senior general officer representation across the Air Force. The outcomes were:

1. **The creation of an ABS general officer's steering group at the Air Staff.**
2. **The creation of an ABS branch at HQ USAF (AF/XOORB)**
3. **The creation of an ABS systems management office at Eglin AFB, Fla. (AD/YQ).**
4. **Tasking a number of specific action items to the major commands and the Air Staff to pursue.**
5. **Convening of a summer ABS Workshop.**

The Air Staff Board and the Air Force Council were briefed Oct. 5, 1981 on the results of the summer workshop. Following that, the overseas Commanders in Chief and supporting major commanders in CONUS were briefed on some specific recommendations, initiatives and solutions from the workshop. A summary briefing on that outcome was presented to a follow-on meeting of the Air Staff Board and Air Force Council in early March focused on making modifications, highlighting those critical base level capabilities voids in the 1984 Program Objectives Memorandum. (We will discuss the outcomes of the ABS Workshop and some of the specific recommendations later in the article.)

Role of E & S

The Engineering and Services community has been a key player and initiator in many of the actions. First of all, in the early to mid-'70s, the late Maj Gen Robert Thompson, at that time DCS Engineering and Services, HQ USAFE, started the ball rolling with the creation of a draft Tactical Air Forces Required Operational Capability statement (now called Statement of Operational Need).

Shortly after, the Director of Engineering and Services at the Air Staff was given the responsibility of chairing the Improved Launch and Recovery Panel, part of the NATO Readiness Coordination Board, which at that time was headed by Gen. Wilbur Creech, now commander of TAC. The panel created a great deal of interest in the Air Staff as well as adding to our knowledge of the sortie launch and recovery implications of many of our wartime actions.

The next item in which Engineering and Services played a key role was the authoring of the air base recovery study portion of the Air Staff's 1978 ABS study which outlined a number of actions since integrated into a master plan of activity in the overseas theaters. A civil engineering officer, Lt Col Richard C. Bergholz, now on the European Air Combat Operations Staff, was a key motivating force behind the Joint Contingency Construction Requirements Study, Phases 1 and 2, at the Joint Chiefs of Staff. A continuing motivator was his replacement, Maj Tom Georges, also a civil engineer. The USAFE air base survivability study, which was undertaken in USAFE in the 1977 time period, was conducted by the Physical Protection Working Group at HQ USAFE, chaired by Lt Col Chuck Lindbergh, assigned to the DCS/Engineering and Services at HQ USAFE, and produced recommendations still being implemented in USAFE. The Prime Beef program was totally restructured Air Force-wide as an outcome of the Joint Contingency Construction Requirements Study to reorient our force structure to more closely parallel the wartime requirements in the JCS study. That placed civil engineering in an extremely contemporary wartime role which many other functional areas are now trying to emulate. Shortly on the heels of that in the late '70s a Prime RIBS program for Readiness In Base Services was created, thereby placing the services portion of the career field in a much more responsive and credible role during war time. At the Air Force Civil Engineering Center (later Air Force Engineering and Services Center) the rapid runway repair program started in the late '70s has spawned like efforts in functional program areas where entire voids or certainly serious deficiencies existed.

Lastly, a NATO air field damage repair interservice working party was chaired by Col Mike Conry. At that time he was assigned to the USAFE DCS/Engineering and Services. The working party drafted a NATO standardization agreement which provides a statement of comprehensive goals for recovery and sortie generation support activities in the 1980s.

Trends

Moving to the transitional part of this article where we talk about trends or shifts in em-

phasis, moving from the historical to the areas ahead, we should highlight that the air base survivability definition is being broadened to include those active defense as well as command, control, and communications and aircraft enhancement areas mentioned earlier in the article.

In the tactical air forces statement of operational need we previously have dealt with only the tactical air forces, i.e., USAFE, PACAF, TAC and Alaskan Air Command. We are now seeing a much greater role for MAC and SAC as key players in this concern as well as air base survivability for the Rapid Deployment Joint Task Force.

Many of the traditional roles and missions assigned to each of the armed forces have been examined and there are many parallels between the shared recovery or war damage repair responsibility of the Air Force and the Army, and the roles and missions for point air and ground defense of our air bases.

We are seeing a greater shift towards measure of merit operational analysis or effectiveness analysis. This is because in the past our approach has been that more of everything has always been better. We can take great pride on one hand in the fact that we have not misused the resources granted to our stewardship by the taxpayers but we are at a new turning point where we must very carefully analyze our future directions to decide what is the most effective balanced investment of our dollars and what buys us the greatest return in ABS for that investment.

Therefore, the initial work on an ABS master plan is now underway which embraces all of the elements of ABS and is based upon theater operational concepts. That will then lead to an investment strategy which will be based upon those modifications and enhancements in ABS which grant the greatest payoff in sortie generation. That is not just a matter of looking for new and novel ways of doing business (which we certainly are doing) but also defining the size of the investment presently planned or underway. It is a substantial investment. When placed in one document you can see how each piece fits. Of course, what we in the ABS community will be doing in the future is in concert with the MAJCOMs and HQ USAF, affecting the program objectives memorandum and, through the MAJCOMs, the financial plan, to insure that we are in fact making the wisest financial investments.

There will be a great focus initially on near term improvements and enhancements in fielded capability. We will use both technical demonstrations in determining the feasibility of procurement and fielding of certain hardware, the implementing procedures, and organizational structure. We will also look at yearly integrated tests in the overseas operating theaters where we can critically analyze those enhancements. We are most interested in those which are ready to move from development into operation, acquisition, and integration with existing systems, procedures, and equipment.

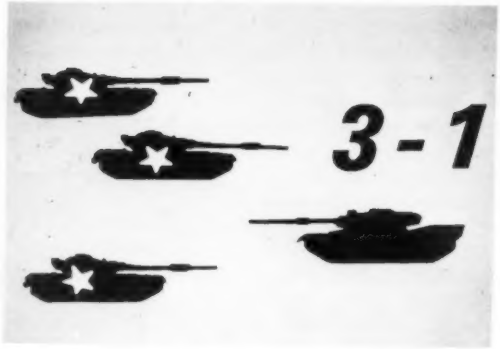
Finally, there is a growing consensus that the most realistic way to enhance capability is by defining incremental plateaus of capability moving from our present capability to the final long range goal stated in either the NATO Airfield Damage Repair STANAG or tactical air forces statement of operational need. This recognizes the potential of an attack or hostile action in the very near future as well as looking at the increasing threat and increasing level of sophistication with which the enemy can confront us in the future.

ABS Workshop

To illustrate this change in emphasis, the Air Base Survivability Workshop held during August 1981 included a group of experts from across the Air Force. They looked at the problem in much broader perspective than before and produced some initial directions for the ABS Systems Management Office and the first rough draft of an ABS master plan. There were three major outputs of the workshop. First, there were implementable, prioritized, specific concepts which could be placed in the master plan and also be pursued by developmental agencies as well as operating commands. Secondly they listed voids and deficiencies; and, lastly, recommended ways to deal with those voids and deficiencies.

A few of the voids and deficiencies that can be covered in this unclassified article are:

- **Point air defense;**
- **Chemical warfare defense;**
- **A mobile aircraft arresting system;**
- **Rapid runway repair systems including damage assessment;**
- **Explosive ordnance disposal**



In addition, deficiencies were identified among rapid repair systems for sortie generators such as POL, air traffic, control and utility systems. Lastly, deficiencies were identified in our organizational structure. A number of recommendations were made by the workshop and have been briefed to the highest levels of our U.S. Air Force. To highlight a few, they are:

1. **Taking the recommended action to assume the responsibility for point air defense at our air bases where U.S. Army capabilities are presently non-existent and enhancing it where it is deficient.**

2. **Fielding a vulnerability assessment team. The team would be based upon a central core of expertise from the Systems Management Office and augmented by personnel from the theater major commands who are capable of providing detailed assessments of each of our installations and making specific recommendations for ABS enhancements.**

3. **Reorganizing at base and command level to emphasize ABS and creating a focal point for the detailed wartime planning, integration, and joint exercising so vital to our real world capability during wartime.**

4. **Supporting the ABS plan and critical funding levels as that plan is published and promulgated.**

5. **Maintaining the ABS momentum by requiring a semi-annual review by senior leadership of the ABS System Management Office initiatives and activities.**

(There are a number of initiatives underway in other functional areas by which Engineering and Services personnel will be affected directly. These demonstrate the multiple fronts on which ABS is being attacked. But space does not permit a discussion of them here.)

SMO/SPO Interface

An extremely positive aspect of the creation of the ABS Systems Management Office at Eglin AFB is that the same organization which is providing the operational analysis and support of the Airfield Attack Systems Program Office (SPO) at Eglin (Blue attacking Red airbases) will be using that same common base for a similar analysis in support of the Systems Management Office. We expect to see a number of payoffs from that effort.

The Future

Moving to the future of Engineering and Services in ABS, we need to highlight the decisions which are coming and will require our study and concern. First, we need more integrated training with the security police, disaster preparedness teams, the explosive ordnance disposal people, and the communicators. That type of integrated training will require more time. It will require not only performing our part of an exercise, playing our own role individually within our own skills, but also interacting with the others in a large, realistic base-wide exercise. There are a number of initiatives being made by the other players in the ABS area. We need to insure that we are a player in those which could or do affect ABS and that we have a game plan of where we want to go. One particular case in point is in the area of mobile communications where certain functional areas have already made a commitment to the type of portable radio which they intend to use. It has many features which could provide a great deal of usefulness to Engineering and Services as well. The tactical air forces have recognized this and are moving forward with a draft SON for that cross-functional need.

Next, in the area of organization, both at base level and major command there are possibilities for the use of a matrix organization where Engineering and Services people can serve the ABS area within their own functional area, but also potentially serve outside of what is now known as Engineering and Services. There are proposals being studied which could allow career field migration in and out of ABS. This is not limited to engineers, and services personnel, but also involves disaster preparedness, security police and others. Each would serve in ABS and return to their own career fields following that assignment. There

Sir Winston's View: RRR in 1940

A letter from Winston Churchill

29 Viii. 40.

Prime Minister to Secretary of State for Air, C.A.S. and General Ismay.

I was much concerned on visiting Manston Aerodrome yesterday to find that although more than four clear days have passed since it was last raided the greater part of craters on the landing ground remained unfilled and the aerodrome was barely serviceable. When you remember what the Germans did at the Stavanger aerodrome and the enormous rapidity with which craters were filled I must protest emphatically against this feeble method of repairing damage. Altogether there were one hundred and fifty people available to work, including those that could be provided from the Air Force personnel and the whole process appeared disproportionate to the value of maintaining this fighting vantage ground.

All craters should be filled within twenty-four hours at most, and every case where a crater is unfilled for a longer period should be reported to higher authority. In order to secure this better service it will be necessary to form some crater-filling companies. You might begin with, say, two of two hundred and fifty each of the South of England, which is under this intensive attack. These companies should be equipped with all helpful appliances and be highly mobile, so that in a few hours they can be at work on any site which has been cratered. Meanwhile, at every aerodrome in the attack area, and later elsewhere, there must be accumulated by local contractors stocks of gravel, rubble, and other appropriate materials sufficient to fill without replenishment at least one hundred craters. Thus the mobile airfield repair companies would arrive to find all the material already on the spot.

I saw some time ago that the Germans filled in the shell holes by some process of having the gravel in wooden frameworks. The V.C.N.S.[1] drew my attention to it during the Norwegian operation, and he could perhaps put you on to the telegram referred to.

In what department of the Air Ministry does this process now fall? After the craters had been refilled camouflage effort might be made to pretend they had not been, but this is a refinement. (Courtesy of Maj Michael S. Carter, Royal Engineers, AFESC/RDCR)

V.C.N.S. refers to the Vice Chief, Naval Service.

are other implications. For instance the role of the base commander expands greatly during wartime. During peacetime he will have the job of being the ring master for integrated training and planning for wartime.

There is another decision to be made. Do we wish to implement base recovery after attack (BRAAT) on an Air Force-wide basis as it is now being implemented in USAFE? If we are to maintain a truly interoperable reinforcing wartime functional area, theater concepts—if at all possible—should require the same training as being utilized in the CONUS. That decision is needed in the near term and great advances have been made recently by the TAF in that regard. Next, our participation in exercises will be affected (whether they be ORI's, MEI's, or NATO TAC Evals). As ABS capability increases and our desire to simulate wartime conditions in our peacetime training continues, there is a greater opportunity and challenge as well as a greater potential for highly visible shortcomings.

Lastly, there are concerns about applying concepts at our theater air bases versus the extent to which we wish to go with our CONUS bases. Just looking at the MX and strategic command, control, and communications, the implications are staggering. Terrorism, as we all have found, is not limited to overseas theaters. It is a very real part of the ABS picture.

In conclusion, we have come a long way. We have an extremely long way to go. We are optimistic that with the recent changes in levels of awareness and commitment to solutions, the vital area of ABS is on its way to being addressed in a positive, comprehensive, and systematic fashion. E&S

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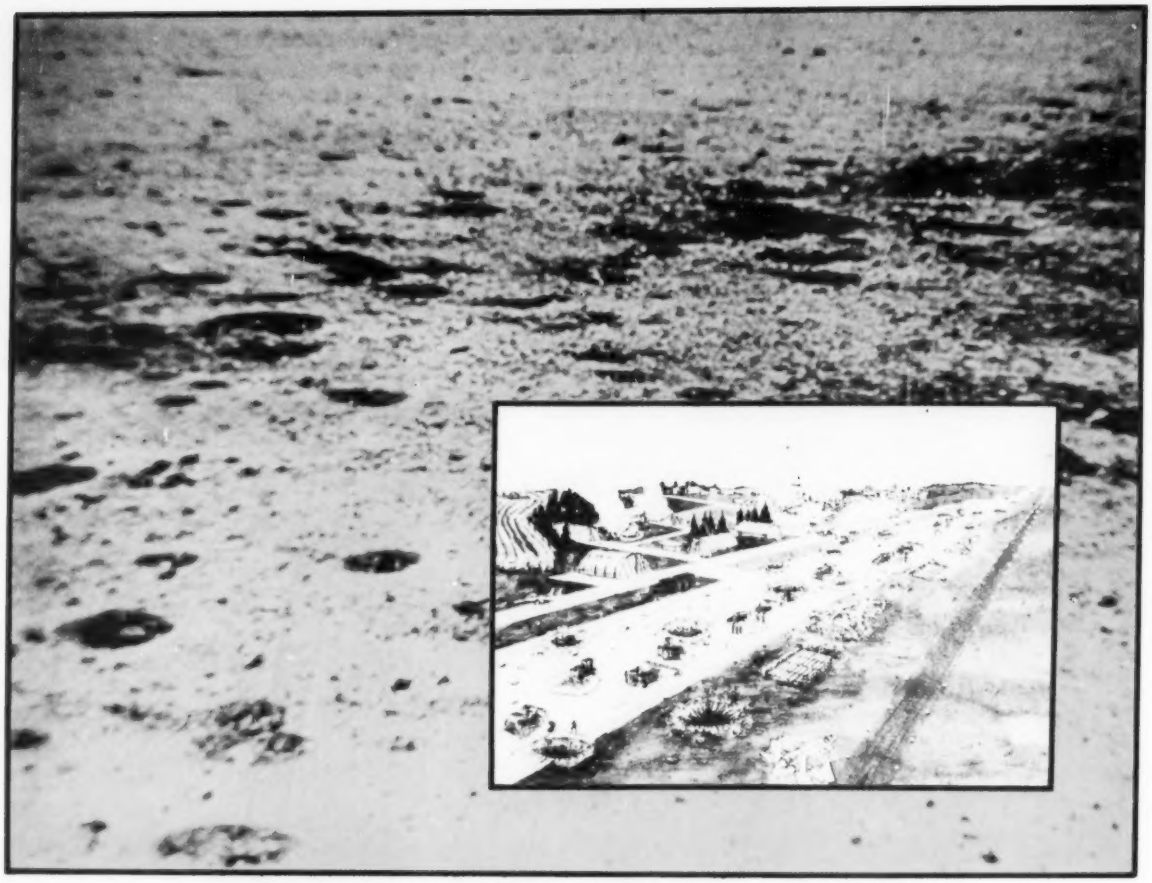


CAN WE SURVIVE AND WIN?

by James R. (Bob) Van Orman and Clarence E. (Clancy) Langford

Our national survival is at stake! Our air bases must be able to withstand massive non-nuclear attacks...if we are to win in a conflict with a numerically superior and very sophisticated enemy. Why non-nuclear? Because, the enemy's advantages are greater at the conventional level and, therefore—logic tells us—the initial strikes against our air bases will most likely be non-nuclear. Secondly, recovery of an air base from a nuclear direct hit would be impractical if not impossible. In order to favorably resolve conflicts at the lowest level (non-nuclear), we must be able to "Conduct prompt and sustained combat air operations..." (AFM 1-1). An inherent component of the airpower warfare system provided to accomplish that mission is the air base. The air base must not only survive massive attacks, but must rapidly recover to operational status. The civil engineer plays the key role in air base recovery. The Air Force Engineering and Services Center has been charged with the principal responsiblility for developing an improved capability.

Throat

The potential capacity of the Soviet Union and Warsaw Pact to inflict severe damage against our airfields depends solely on their decision to commit large numbers of available forces against our air bases. The only inhibitor is our ability to resist those forces. With the large number of aircraft available and the large quantity of diverse weapons they can carry, they could make air base survival and recovery impossible if we do not adequately plan and organize to meet the threat.

In fact, in the European theater, with logistics supply lines and operating radii so much of an advantage to the Warsaw Pact, the enemy can employ so many bombers and fighter-bombers it would seem that his major operational problem is scheduling arrival times over the target to avoid mid-air collisions. Such an attack would leave a chaotic scene of damaged structures, POL and ammo storage areas as well as pavement areas with numerous large and small craters, hundreds of scabs or spalls, anti-personnel and anti-vehicle bomblets, unexploded ordnance of all types above and below the surface, and an environment saturated with chemical warfare agents.

Organization and Training

The late Gen Laurence S. Kuter said in 1954 that after hostilities start there will be no time to correct mistakes in the manner in which we have been organized and trained. Organizations must function during hostilities without radical changes in the way they have organized and trained in order to avoid confusion in the recovery process. Delays and confusion will result in failure to achieve victory. Organization of recovery forces is considered so vital that it was at the top of a list of candidates for improvement prepared by the Airbases Survivability System Management Office (AD/YQ). This "unity of command" principle that applies to the upper echelons of the Air Force should also apply to the base level command responsible for the rapid recovery of the air base after an attack. Training should be accomplished often and with as much realism as possible. The air base survivability workshop also recommended an increase in unit readiness inspections, adding weight to those factors involving air base recovery.

Damage Assessment

Developing the capability to rapidly repair airfields within hours after attack requires that damage assessment be accomplished within minutes. Damage assessment is currently done by three to five-man teams who walk over the pavement system identifying the size, type and location of bomb damage and unexploded ordnance (UXO). This currently requires many hours to accomplish under the best of conditions. The hazards of UXO or possibly chemical/biological agents significantly impact the ability to accomplish damage assessment.

When the damage and ordnance are identified and reported to the control center, the next requirement is to identify the areas requiring repair in order to make the airfield operational. Only those pavement surfaces absolutely necessary for aircraft operations need be repaired. Identifying the minimum operation strip (MOS) and aircraft access routes to the MOS is a critically important step in damage assessment. The best MOS, the one satisfying aircraft operational requirements but requiring the least amount of repair effort must be selected. The MOS selection team also dictates the quality of all final repairs and insures that the location of repairs on the MOS satisfy surface roughness criteria so the aircraft will not be damaged.

Interim (manual) MOS selection procedures have already been developed for the F-4 aircraft and provided to the field and to Prime BEEF training sites. Procedures are also being developed for other aircraft. Work is also underway to automate the MOS selection procedures to pinpoint the best MOS on the airfield and to do it much faster.

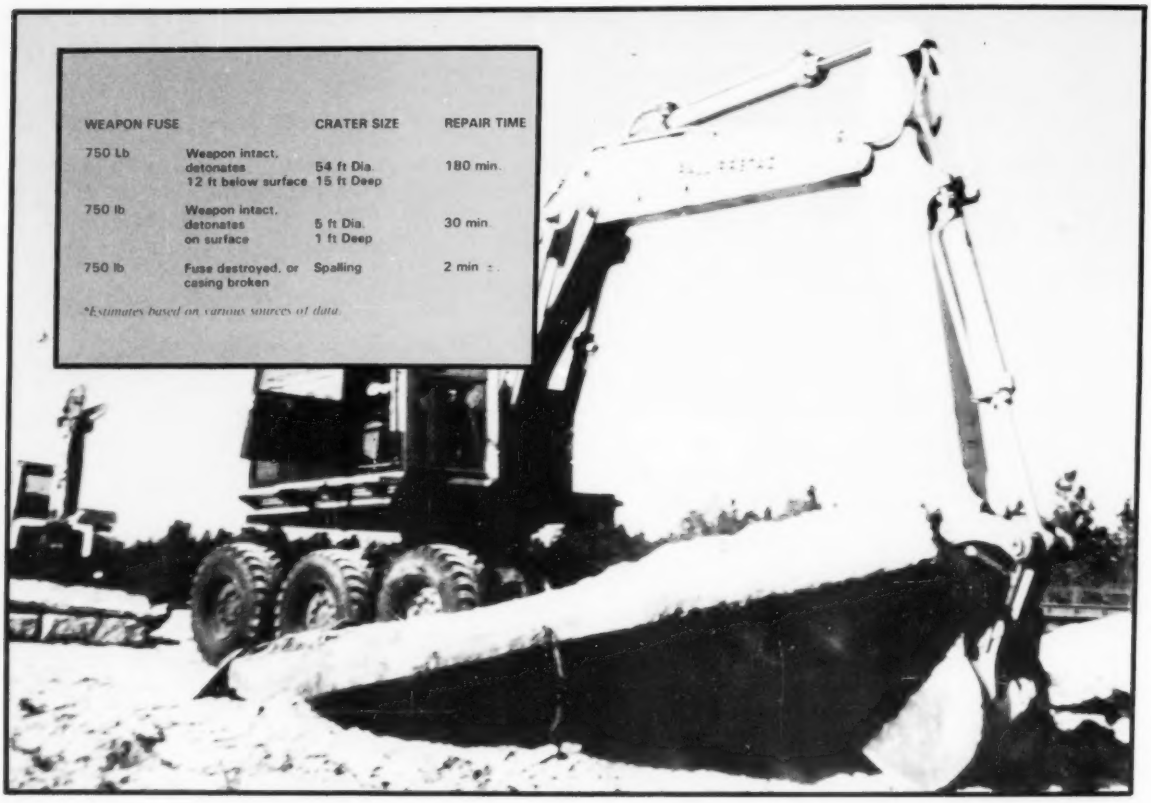
The damage assessment tasks and procedures have been analyzed in depth to identify areas for improvement. A research effort is currently underway to develop procedures and techniques incorporating electronic surveying equipment or —alternatively— advanced electronic position locator equipment into the damage assessment system. For the future, AFESC has recently completed testing and validation of the aerial damage assessment concept, which has great potential for improving speed, accuracy, and safety.

With the aerial concept, a line-scan video recorder is flown over the runway recording the damage and exposed ordnance in digital format. The recording can be immediately played back through a printer to provide a complete picture of the airfield damage approximately 15 minutes after the attack. Using a minicomputer with MOS selection software, all data can be analyzed and the best MOS selected within 30-60 minutes after the attack. With AFESC assistance, the Aeronautical Systems Division (ASD) is now initiating full-scale engineering development of the airborne damage assessment system. ASD will evaluate other types of sensors that may provide the required imaging under adverse weather and lighting conditions.

Adverse Environment

Recovery operations will be conducted in a very hostile environment. Bomb craters, straffing and rocket damage, unexploded bombs and anti-personnel bomblets may be prevalent. We can assume a toxic chemical environment. We can also anticipate that the enemy may well choose an extreme weather environment, either very hot and arrid or very cold, in which survival will depend on prior planning and common sense.

Unexploded weapons will be disarmed or removed by Explosive Ordnance Disposal (EOD) personnel. However, some of these weapons will probably be hidden in craters or



WEAPON FUSE		CRATER SIZE	REPAIR TIME
750 Lb	Weapon intact, detonates 12 ft below surface	54 ft Dia. 15 ft Deep	180 min.
750 lb	Weapon intact, detonates on surface	5 ft Dia. 1 ft Deep	30 min.
750 lb	Fuse destroyed, or casing broken	Spalling	2 min ±.

*Estimates based on various sources of data.

under debris. Consequently, initial repair operations must proceed cautiously. Debris should be cleared with hardened equipment, if possible. Analyses have shown that some relatively inexpensive hardening measures will greatly improve the survival rate of equipment and personnel. For example, for a large bomblet exploding 20 feet away, a helmet and flak vest will increase an individual's probability of survival from three to 21 percent. An investment of roughly $15,000 in hardening materials for a front end loader will increase the probability of survival to 95 percent (at the same distance from the explosion). Simple earth berms dozed around unexploded bombs which are within 500 feet of the repair strips will increase the probability of surviving explosions of these bombs to nearly 100 percent.

The repair team must also be able to cope with a highly toxic chemical environment and essentially all weather conditions - rain, snow, fog, high or low temperatures, etc. The combination of chemical attack and extreme temperatures would be especially difficult for the repair team. In fact, recent tests at Eglin AFB has shown that repair operations are the most physically taxing of all post attack operations. At temperatures above 80°F, the repairs can only be completed if the personnel have a rest cycle sometime during the operation. Even equipment operators become overstressed above the 80°F while in the chemical gear. However, use of air conditioned cabs on equipment would greatly increase the no-rest working time for equipment operators.

When RRR must be accomplished in a chemical environment, several factors must be considered to insure that the repair operations are completed as expeditiously as available manpower allows. Several of our civil engineering personnel have experienced the wear of the complete chemical ensemble for very short periods of time; however, only a handful of CE personnel have worn the complete ensemble during an actual crater repair operation. The observation of individuals performing RRR activities in chemical ensembles revealed some startling facts. For example, everyone has accepted that the M17A gas mask is hot, reduces peripheral vision, and in some periods of time at temperatures in excess of 80°F, the moisture accumulation from wearing the mask creates skin and eye irritations or vision impairment. These factors have a psychological impact on

the individual which science has been unable to quantify. For example, in tests at 78°F some personnel became psychologically aggravated and simply removed the mask; however, in a real chemical environment death would almost immediately result from this action.

In an attempt to quantify the physiological effects personnel encounter during an actual RRR exercise, scientists from the School of Aerospace Medicine (SAM) were asked to evaluate and collect data on volunteer subjects at the Prime BEEF training site Auxiliary Field 4, Eglin AFB, Fla. These scientists determined conclusively that stress imposed by wearing chemical defense protective equipment combined with environmental heat stress resulted in an alarming frequency of heat and fatigue related casualties.

Medical personnel further concluded that only those personnel who were found to be above average in aerobic capacity (physical fitness) and at least partially heat acclimated, as indicated by recent regular exposure to heat and exercise, were ably to complete their task without incident. It is now clear that an individual's chances for survival in this kind of environment are directly related to his physical fitness.

Realistic chemical warfare RRR training at base level is vital. This type of training not only accustoms personnel to wear the chemical gear but also helps to identify the shortcuts and workaround efforts that are necessary for work in chemical gear. During home station training, the supervisors must be aware of the potential for heat stress exhaustion. (Which can occur at ambient temperatures above 50°F.) Several outward manifestations can indicate high internal body heat, symptoms such as muscle vibrations in the forearm, flushed facial conditions, staggered walk, hyperventilation, and irritability over seemingly inconsequential items. With each training exercise personnel should be encouraged to wear the chemical ensemble for longer periods of time. Even when rests are necessary because of fatigue or heat stress, personnel should be required to wear the chemical ensemble.

The RRR effort is a team exercise and when personnel of the team are lost there is a direct impact on the amount of time that must be added to complete the task. Therefore, every person must know his own limits and should be aware of the people who are working nearby. In this way, we can insure that personnel who are nearing critical fatigue or heat stress levels are properly rested. Also, short, frequent rests are more efficient than extensive, but less frequent rest cycles. (See "RRR in the Chemical Environment," by Maj John A. Centrone, p 20.)

Alternate Surfaces

Following an attack, the most urgent requirement is to locate an undamaged area suitable for the immediate recovery of airborne aircraft and/or to launch previously withheld aircraft. Aircraft forced to recover at bases without logistical support may never have an impact on the outcome of the conflict. If the primary runways and taxiways are seriously damaged, they may not be useable for hours—or days! Consequently, alternate launch and recovery surfaces are essential to provide an **immediate** capability for a limited number of aircraft to recover and launch. Three concepts have been considered to provide this capability.

(1) Increased surface redundancy to improve the probability of having an undamaged emergency strip.

(2) Damage resistant pavements or covers.

(3) "Instant" runways which could be established after an attack.

Of these concepts, increased surface redundancy has the most promise. Based on the selected threat scenario, from one to 10 million square feet of preconstructed surface, properly located, will be required to insure that an undamaged minimum operating strip will be available. Obviously, the more redundancy, the more likely to have lower levels of damage even if a completely undamaged MOS isn't available. Feasibility of this approach depends on the development of pavement systems that are low-cost to install and low or no-cost to maintain. Research is being conducted to provide this low-cost pavement material. Soil cement surfaces, very thin concrete with steel wire reinforcement, fabric reinforcement of soils, and numerous other ideas are being investigated. The effects of aircraft jet blast, braking, tail hook engagements, turning at various speeds and other effects on these surfaces are being examined.

Damage-resistant pavement or readily-removable covers also have some promise, especially for bases with restricted real estate. The idea is to make a surface hard enough to break the bomb fuse or casing, or to prevent penetration. Damage can be dramatically

reduced if the penetration can be effectively resisted.

The concept of an "instant" runway has also been investigated. Unfortunately, there are no known techniques which make this concept viable. A significant technological breakthrough is required before further effort will be expended in this area.

Bomb Damage Repair

The Air Force must be able to conduct **sustained** combat air operations in order to win a non-nuclear war. Since the alternate surfaces are designed for only a "limited number" of aircraft operations, the main runway or adequate taxiways must be rapidly repaired.

Today a typical RRR team is able to repair three large craters in four hours—under essentially "perfect conditions." We must be able to repair **many** more craters in "worst case conditions," and we must be able to do it faster. AFESC is developing new methods to repair virtually all types of battle damage to the existing airfield pavement systems. These repairs must be extremely fast, simple, reliable, economical and relatively flush. To meet those criteria, advanced materials, equipment, and procedures must be developed.

The best and fastest method of repairing craters for the near future is to use a crushed stone "cap" over returned debris, with a 3/8th inch thick fiberglass reinforced polyester cover which is bolted to the surrounding pavement.

Straffing and rocket damage (scabs/spalls) can be readily repaired with a special polymer cement and with aggregate. The materials are mixed together for about two minutes and then poured into the damaged area, with the excess screeded off to make a flush repair. Within approximately 20 minutes the repair is strong enough to withstand aircraft traffic.

For the future, AFESC is developing more advanced repair techniques which will be even faster. Equipment to mix and place the advanced materials, rapidly remove upheaved concrete, and compact debris and stone is also being developed.

Goals

The current RRR program was started in 1978 based on the AF determination that the capability to recover from an air base attack is inadequate to meet the ominous threat. The program was structured to meet stringent requirements by 1986, with interim improvements to be provided directly to the field user.

The original short-term goals were all met between 1978 and 1980. The most significant were the surface roughness guidance for the F-4 aircraft and interim bomb damage repair guidance for spalls and small craters. The highlight was the North Field, S.C., exercise conducted in August of 1980 to validate the interim guidance. Also, specifications were published for the improved RRR equipment package using off-the-shelf commercial equipment.

Mid-term program goals are from 1981 through 1983. Already the final F-4 C/D/E surface roughness criteria have been published and improved MOS selection methods have been introduced. Aerial damage assessment technology to rapidly assess levels and types of damages, as well as locate unexploded ordnance on the surface, was demonstrated at North Field and has been transferred to ASD for full-scale engineering development. In December of 1981, RRR interim planning guidance was issued, including the very latest in bomb damage repair information. Yet to be accomplished under mid-term goals are publication of a revised AFR 93-2 and additional aircraft surface roughness criteria.

By 1986 a much faster RRR system will be developed and, correspondingly, procedures published. Surface roughness criteria for five fighter and five cargo aircraft will also be available. These criteria will be used to determine the allowable aircraft operations over partially damaged and repaired surfaces. Construction criteria and plans for alternate surfaces will be prepared. If required, unique rapid repair procedures for alternate surfaces will be developed. After the research and development has been accomplished, a comprehensive DT&E will be conducted to verify the "advanced" RRR system. Finally, a complete post-attack planning guide will be devised to enhance employment of the RRR system.

In short, our ability to survive and win is rapidly advancing. E&S

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Clarence E. (Clancy) Langford (LtCol, USAF ret.) was fighter pilot in the Aerospace Defense Command, squadron operations officer and a mission commander flying F-105s at Korat RTAFB in 1968. He joined the Air Force Engineering and Services Center, Engineering and Services Laboratory RRR research team in January, 1980. He has the baccalaureate degree in industrial technology and master's degree in public administration from the University of West Florida.

tecnotes

FMC MULTIPURPOSE SWEEPER MODIFICATIONS offer good potential for improved reliability, maintainability and performance. The new kits, approved by Warner Robins Air Logistics Center, include gutter broom extensions, new suction hood flaps, hydraulic pump relocation and a tri-phase air cleaner and can be procured individually. A new service bulletin has also been issued to provide valuable information on the sweeper's air pulse filter cleaning system. Further information can be obtained from MAJCOM/DEM/LGT offices. (AFESC/DEMG, MSgt Shier, AUTOVON 970-6399)

AIR-TO-GROUND RANGE REQUIREMENTS have been developed for aircrew training events that supplement AFR 50-46 guidelines. A set of 74 geographic footprints show area requirements for gunnery, dive bomb, and rocket events against scored and tactical targets. The footprints can be used to identify potential problems during site development. This includes safety locations range control towers, scoring instrumentation, cameras, and storage areas within the range boundries. (AFESC/RDV, Maj Thompson, AUTOVON 970-2097)

RRR INTERIM GUIDANCE distributed to MAJCOMs in December assists in enhancing current RRR capabilities. The interim guidance includes: crater repair procedures using crushed stone with fiberglass reinforced polyester (FRP) mat covers; scab repair using Silical® polymer concrere; FRP mat specifications; minimum operating strip planning data, selection criteria and procedures. (AFESC/RDCR, Maj Carter, AUTOVON 970-6313)

RRR EQUIPMENT HARDENING, a forthcoming technical report, will include analysis of the state of the art in equipment hardening and the vulnerability of RRR equipment to various threats. The most promising techniques will be tested and a subsequent design for hardening RRR equipment is contemplated for this fiscal year. (AFESC/RDCR, Mr Alexander, AUTOVON 970-6326)

BEAMS — Bases have been successful in gaining approval of additional terminals and printers for BEAMS using the local data automation requirement avenue. Continued use of this avenue is encouraged to relieve the problems of terminal scheduling. An automation requirement has been projected in the FY84 POM to add over 370 terminals for BEAMS; however, it currently has a low priority within the budget. (AFESC/DEMG, Maj Golondzinier, AUTOVON 970-6390)

AUTOMATING POM/MCP DEVELOPMENT SECTION — To respond to this year's requirement to provide FY 84-88 military construction program (MCP) data base by overall priority, by Program Decision Package (PDP), and by priority within PDP, HQ ATC/DE and ACD developed a command-unique COBAL program on the Honeywell 6000 system. This allows the flexibility to insert projects, reorder priorities, control total PDP costs in any manner, visually display data, and make necessary edits. The machine products were used as drafts to type final MCP/POM inputs. Planned revisions will allow direct computer production of final MCP/POM inputs ready for reproduction. (HQ ATC/DEP, Mr Wentz, AUTOVON 487-6132)

STATIC ELECTRICITY — A liquid fuels maintenance technician recently sustained burns on his hand while servicing a jet fuel filter separator. Escaping vapors from a manual vent valve were ignited by a static electrical arc from his hand to the valve. Installation of automatic air eliminators on each filter separator will preclude this hazard. (AFESC/DEMM, Mr Mumme, AUTOVON 970-6357)

MICRO COMPUTER USERS GROUP — George T. Kraus, P.E., chief, Environmental and Contract Planning, Pease AFB would like to start an Apple II computer users group. The purpose of this informal group is to share programs and programming techniques. Those people interested in joining this unofficial group should contact Mr. Draus at AUTOVON 8452-2586.(AFESC/DEMG, Maj Golondzinier, AUTOVON 790-6390)

CROSS CONNECTION CONTROL AND THE BACKFLOW PREVENTION PROGRAM for the Air Force is outlined in the new AFM 85-21 published in February, 1982. This program is a result of the Safe Drinking Water Act of 1974. In addition to delineating the Air Force Program, AFM 85-21 will serve as a reference manual for craftsmen and engineers. (AFESC/DEMM, Mr. Mumme, AUTOVON 970-6357)

TRIPLE R IN A CHEMICAL ENVIRONMENT

by Maj John A. Centrone

How effective is Prime BEEF in performing Rapid Runway Repair while wearing the full chemical ensemble? Because very little scientific data is available to analyze Prime BEEF personnel in this environment, I requested the School of Aerospace Medicine (SAM) to conduct physiological testing of volunteers while accomplishing the RRR effort at the Prime BEEF training site at Field 4, Eglin AFB, Fla. CMSgt Harlen E. Catlett, who manages the Prime BEEF training site, was extremely helpful in ensuring that subjects were allowed to perform the repair operation as rapidly as would be expected in a wartime environment. Because I had only limited experience I decided to volunteer to accomplish the RRR effort in the chemical environment.

The first day was relatively cool (72°F). Nevertheless, we all donned our chemical gear in an air-conditioned facility. This may seem unnecessary. However, by the time we completed dressing, sweat was dripping down our faces, arms and legs. Before we were completely suited, up, in order to record any physiological occurences, each volunteer was wired to instrumentation designed to record heart rate, skin and body core temperature. Each was then weighed.

The task was to work as two-man teams, removing matting from stacks of eight 144-pound mats, taking each piece approximately 10 feet, and laying it over a simulated patch area. Detailed tasks included working in a coordinated manner to engage the edge interlocks.

Because I had handled the AM-2 matting before, I did not anticipate any problem in completing the task. It wasn't until somewhere into the second stack that I realized that my hands were numb and that carrying the mat was becoming extremely difficult. It was at this point that I was told my body core temperature had reached 38.7°C (101.66°F), and that if I experienced dizziness or blurred vision to take myself out of the exercise. (Due to safety reasons any volunteer whose body core temperature reached 39°C was to be removed from the exercise.). Therefore, with two and one-half more matting stacks to go, I decided to slow down my pace dramatically. In addition, I decided to focus my total thinking to lifting and placing matting ONLY! (It should be remembered that in a real situation there would be excitement, numerous pressures to work harder, harassment and disruption caused by late-detonating ordnance and potential confusion and danger imposed by emergency forces conflicting in the heat of response.)

While placing matting from the last stack I had reached a temperature of 39°C, and I was requested to terminate my participation in the exercise. Because I felt a driving need to know and appreciate what it took to finish the task, I pleaded for and received permission to continue. By now each step took total mental concentration to accomplish. It seemed that nothing came automatically. The least little disruption was extremely irritating. Every part of my body was wet and in pain, and I was fighting the urge to tear off the mask in order to gain some relief from the oppressive heat and humidity. The feeling is not claustrophobia — the fear of having one's air disrupted or the sense of being confined in a helpless state. Instead, it is a demanding bodily reaction to heat, sweat, exhaustion, frustration and cumulative stress.

Four of the original eight subjects finished the exercise with the help of other Prime BEEF personnel who were not wearing chemical gear. My body tempera-

ture was 39.2°C (102.56°F) at the completion of the task. I had spent one hour and 18 minutes in the gear and I had lost 4.8 pounds of body weight.

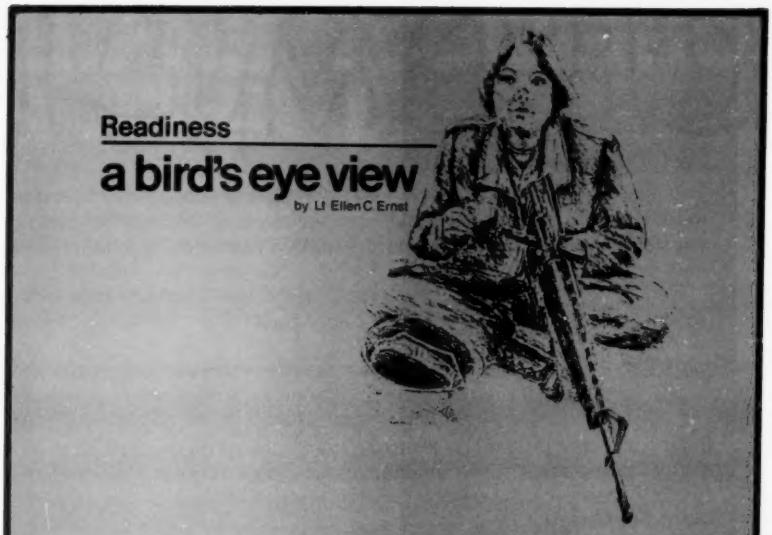
After my third RRR exercise I realized that if civil engineering was to perform its mission effectively, a new ensemble and/or major modification would be necessary to the current chemical gear. It also became very apparent that the physical condition and mental control of the volunteers during RRR testing reflected a need for more concentrated training in the wear of the ensemble and familarization with heat stress conditions that could be expected during 75 to 85 degree ambient temperatures.

Consequently, major RRR chemical testing/training is programmed for FY 82 and 83. In addition, a computer-generated RRR program is being developed to forecast critical task and manpower limitations against the current threat.

In an attempt to identify a useful second generation ensemble, two different concepts were field tested at the Prime BEEF training site. Much to the dismay of all participants, both ensembles failed to produce measurable advantages over the current ensemble. Although the redesign concept appeared valid, additional technological developments are necessary before either ensemble is ready for full scale field testing.

Accepting the fact that the current ensemble will be worn by civil engineering troops for the future, I personally believe that extensive familiarization training is required because, only with top physical and mental conditioning do I see a Prime BEEF effort being able to effectively accomplish the RRR mission. E&S

Maj John A. Centrone is a graduate of the Citadel with a bachelor of science degree in civil engineering. He has done graduate work in business and management at Northern Colorado State College, New York University and UCLA. He is assigned to the Air Force Engineering and Services Center, Tyndall AFB, Fla, where he is assigned to the Engineering and Research division of the E&S laboratory.



Readiness
a bird's eye view

by Lt Ellen C Ernst

Winner of the Maj Gen A.M. Minton award for the best article in last year's Air Force Engineering and Services Quarterly is Capt Ellen C. Ernst, now a navigator assigned to the Strategic Air Command.

Her winning article, published in the Summer issue, was "Readiness: A Bird's Eye View," detailing her insights as a female engineer assigned to a Prime BEEF squadron at McChord AFB, Wash.

The award was announced at the Engineers' Week observance at Bolling AFB, D.C., in February. She was unable to personally receive the award. Her Loring AFB KC-135 crew began a series of temporary duty assignments just before the award ceremony date. Gen Andy Anderson, USAF (retired), made the announcement in behalf of the Aerospace Education Foundation of the Air Force Association, sponsors of the award.

Runnersup for the 1981 judging were "Improving Base Services," by Lt Col Jack W. Barbeau, Kadina AB, Okinawa, and "North Field: Meeting the RRR Challenge," by Col Robert E. Boyer, Malmstrom AFB, Mont., and Phillip T. Nash, formerly of the Air Force Engineering and Services Center. Tyndall AFB, Fla.

Colonel Barbeau's article appeared in February. The article by Colonel Boyer and Nash appeared in the summer issue.

Captain Ernst was selected for navigator training while at McChord. Following training at Mather AFB, Calif., she was assigned to SAC and a KC-135 crew at Loring AFB. She holds a bachelor's degree in architecture from Carnegie-Mellon University, Pittsburgh, Pa. She is a member of the Society of American Military Engineers.

CESMET tips

The Air Force Civil Engineering and Services Management Evaluation Team (CESMET) reviews, evaluates and assists base civil engineering and services functional areas in accomplishing their mission in the most efficient and effective manner. This department is designed to pass along new ways to do the job better.

BUDGET

During a recent visit we saw strong involvement on the part of shop foremen and superintendents in budget preparation. Their valuable inputs were of great assistance to the funds manager in preparing the BCE input for the base operating budget. We view this as a good approach. The more involvement the better!

As the financial advisor to the BCE, your job is a difficult one. You need the support of the entire CE organization to communicate all known dollar requirements into the base financial plan.

CONTRACTING

Almost all Air Force bases now have service contracts which require the use of Quality Assurance Evaluators (QAE) and contract surveillance techniques found in AFR 400-28. Random sampling of the contractor's performance is a significant part of the government's surveillance program.

The Air Training Command QAE mobile training team instruction now provides a simple way for QAEs to generate random numbers which are required to perform the surveillance program. A very simple computer card format allows some base level data automation offices to provide a QAE with a "hard copy" of random numbers each month for specific lot and sample sizes. This "hard copy" of random numbers can then be placed in the QAE's surveillance file for review or audit purposes.

This is an easy way to close the loop on random sampling. Give CESMET a call if you would like a copy of this simple procedure and computer card format. AUTOVON 970-6115.

MATERIAL CONTROL

At Altus AFB we recently saw the use of two local forms which help them insure the job gets done.

One form is sent to the planners notifying them that a bill of materials is complete and requesting that the responsible individual come to the holding area to review the materials. When this action has been completed, the form is annotated and becomes part of the work order/job order folder. This form insures the validation is completed and helps to eliminate missing materials or substitutions that are not acceptable.

Altus also places a form in the work order/job order folder when a completed bill of materials is issued. This form is filled out after the job is completed indicating the 1445 has been annotated and all residual materials have been turned in to Material Control. Work authorization documents are not signed off until the form has been signed by the shop and Material Control. The form serves as a reminder that the job is not complete until all residue has been properly turned in and as a check point for production control to insure this important step has been completed.

For additional information contact SSgt. Everett L. Kerns at Altus (AUTOVON 866-7117).

FOOD SERVICE EQUIPMENT AVAILABILITY

Food production for Air Force dining facilities is directly dependent upon equipment available. If equipment is inoperative production decreases. Inoperative equipment has a detrimental impact on workers as well as the customer. Therefore, supervisors should be aware of equipment operational status or availability.

The following are some benefical procedures we have seen in practice at various bases to insure equipment availability:

a. Maintaining complete and accurate work order logs.
b. Initiating a definitive follow-up procedure for work orders.
c. Including status of equipment work orders in the commander's update briefing.
d. Staying on top of operator care and maintenance.
e. Provide an operator use and care of equipment training program.
f. Replacing worn out equipment (ordering in sufficient time for equipment replacement prior to the expiration of life span).

Following the above procedures will reduce downtime on all food service equipment and insure maximum production levels. Equipment, in concert with people, is an important resource.

CIVIL ENGINEERING

How is your customer evaluation program? Are your people leaving an AF Form 1255 with the customer when they finish the job? Do you know what your issue rate is or is it estimated? Do you publicly praise those people who receive outstanding comments?

We have seen some very good programs recently. At Edwards AFB, Calif., 1255s containing good comments were posted on a large, professional looking bulletin board. The board is located so all visitors to the Customer Service area and the CE conference room must pass it. Outstanding workers' names are highlighted each month.

At Minot AFB, N.D., the 1255 issue rate for job orders having an identifiable customer was over 90 percent and almost 60 percent of these were returned. They achieved these high rates using the following procedures.

– A blank 1255 was attached to each job order.
– The soft copy of each job order was stamped with the words "AF Form 1255 Received by ."
– All non-customer related 1255's and JO's were annotated NCR.
– Soft copies of each JO were forwarded to the IE along with all returned 1255s.
– The control number on 1255s was the same as the JO or WO number (except SMART 1255s, issued in numerical sequence).

Customers were asked to sign the job orders when they received the 1255 and the procedure was covered in the base newspaper. A monthly newsletter entitled "FEEDBACK" was published each month containing the names of the outstanding workers and sample comments. For more information on this program contact MSgt Hudson, DEI at Minot, AUTOVON 344-3804.

HYDRANT FUELING EXCESS FLOW CONTROL

by Patrick G. Mumme
Mechanical Engineer, AFESC/DEMM

Several liquid fuels supervisors have been experiencing difficulty in adjusting the Clayton CDHS-3 differential control. This device is used to control excess flow through the refueling control valve on Pritchard and Pinero hydrant fueling systems. It is a snap-action pilot valve, operated by differential pressure. Its purpose is to shut down fuel flow in case of a hose break or similar system failure.

The adjustment process described in AFM 85-16, Maintenance of Petroleum Systems, is very difficult if not impossible when the orifice plate is improperly sized. The orifice plate bore may be incorrectly sized as a result of system changes over the years. Flow rates may not match those of the original design.

If the CDHS-3 is not adjusted properly, two problems can occur. First, the control will be so sensitive that the valve will trip prematurely resulting in interruptions during aircraft servicing. When this occurs, the second problem is a tendency for personnel to set the differential pressure to a point where it becomes impossible for the valve to trip at all. This, of course, could result in a massive fuel spill.

The solution is to replace the orifice plate with one of the proper size. Sizing can be accomplished using information found in Atch A-4 to AFM 85-16. While this problem is relatively uncommon, it does deserve attention in view of the potential result.

WHEN THE BALOON GOES UP

by Lt Col Eugene A. Lupia

To illustrate the interrelationship of the elements—both military and civilian—which go into a national mobilization exercise, our research team looked at the specific area of the Air Force's CONUS sustaining force. To be even more specific, we chose the civil engineering area. We selected this function in the Air Force, as opposed to the Army or Navy, because the Air Force has the largest combat support CONUS wartime requirements. It is important to realize that our objective is to examine a process which could be used as a representative model for any functional support area. Similar logic and steps could apply in looking at transportation, services, security police, etc.

CONUS Missions Supported

The CONUS missions to be supported include:

(a) **Strategic Air Command** — Strategic offensive weapons systems including missiles and the bombers and tankers which disperse and then recover in the CONUS.

(b) **Aerospace Defense Tactical Air Command** — Strategic defensive systems, including the radar sites/SAGE facilities and interceptors.

(c) **Military Airlift Command** — Strategic airlift and aerial ports.

(d) **Tactical Air Command** — Other residual wartime aircraft activities.

(e) **Air Force Logistics Command** — All the logistics depot functions that make up our logistics support base.

(f) **Air Training Command** — Training requirements.

(g) **Air Force Systems Command** — Research and development efforts; industrial production.

In addition, there will be an array of spinoff actions. Base recovery activities as a result of enemy attack or terrorism will also be a concern in the CONUS.

Can We Support the CONUS Missions?

The need, then, is to validate whether or not the civil engineering CONUS sustaining force, as it is presently envisioned and postured, has the capability to meet the requirements of the missions outlined above. This determination could be made through the exercise process. The result of the test would be used to develop recommendations to improve the use of existing resources — both military and civilian — among competing needs during total mobilization. Some of the major items to be considered in the context of national mobilization exercises are:

(a) Was the civil engineering CONUS sustaining force — both in-house Air Force personnel and/or the national construction industry — considered/tested in NIFTY NUGGET or PROUD SPIRIT?

(b) Should this force have been considered? Does it in fact "play" in a national mobilization exercise?

(c) If you did test the force, how would you test it? What would the timelines be? What would be the sequence and flow of events?

(d) Is it necessary to actually deploy major forces in order to measure the capabilities of those left behind?

(e) How do the in-house Air Force personnel and civilian construction contractors interface?

Survival of the United States as a free nation is one of our paramount goals. Our mission is to defend our nation to the utmost of our capabilities, with the deepest measure of personal commitment, with new priorities governing our lives, and the willingness to accept personal sacrifice for the national survival. At one point in our recent history we were faced with but three basic military challenges: A rapid global nuclear war which could quickly devastate civilization as we know it; wars in remote areas of the world, involving the employment of friendly forces against a surrogate of the Soviet Union threatening our lifelines; and small, isolated actions in which friendly nations come under stress.

Recent debate has centered on the possibility of an all-out global or theatre confrontation between superpowers in which the exercise of strategic nuclear capability is always an imminent possibility, but may not occur for a protracted period of the hostilities. In fact, if conventional forces are successful in deterence or combat, nuclear exchange is precluded. In such a confrontation, the forces — military and civilian — tasked with essential support and production at home would become extremely critical to the success of our warmaking effort. In a brief period, we would see the visible reminders of the gigantic effort mounted by the United States during World War II. This line of thought has caused us to reexamine the sustaining forces in the Continental U.S. (CONUS).

Eventually, when we examine such a return to previous military thinking, we must explore the economics of war. By economics, the broadest interpretation of the word is meant. It is the entire spectrum of resource analysis, including manpower, industry, the role of the civilian population, and the dynamic interplay of transportation, materials, food and energy resources, and the design, redesign, production and employment of new weapons systems and capabilities.

Critical to this line of thinking is the CONUS sustaining force. Lt Col Eugene A. Lupia, a student at the Industrial College of the Armed Forces, dealt with this subject in his Mobilization Studies Program research paper. He proposes that the CONUS sustaining capability cannot be measured short of testing in a national mobilization exercise. Presented here is an edited version of this part of the thesis.

Editor

(g) Will the Air Force receive assistance from Federal Emergency Management Agency (FEMA) or the Departments of Commerce, Labor, and Transportation, to solve problems that might be uncovered in a national mobilization exercise? (In 1979, the Federal

Emergency Management Agency was organized to plan, coordinate and evaluate civil preparedness. Until the establishment of FEMA, Federal agencies were responsible for various segments of civil preparedness planning but no one agency had overall responsibility. Prior to establishment of FEMA, efforts were disjointed, splintered, and multi-directional resulting in an ineffective program.)

NIFTY NUGGET and PROUD SPIRIT

As we looked at NIFTY NUGGET and PROUD SPIRIT we found command post exercises designed largely to look at the deployment of forces, including civil engineering, to the wartime theatre. Forces were played only from the place and time of mobilization, through to their departure from an aerial port of embarkation, enroute to the theater being supported in the exercise scenario. PROUD SPIRIT in 1980 was really a replay of much of the 1978 NIFTY NUGGET scenario. It was used to determine if changes and system improvements — all of which looked at the deployment of forces — were implemented and were realistic and workable.

Excluding the fire protection function, civil engineering wartime theater tasks were all centered around the beddown of deploying forces, the operation of critical facilities and utility systems at the bases to which forces deployed, and the repair of bomb-damaged airfield pavements and facilities. It must be emphasized that in both these exercises there was no competition for resources and that personnel and equipment did not actually move. Thus, in the context of testing the CONUS sustaining force a field training exercise (FTX) would be required to complement the command post exercise (CPX).

Civilian Construction Industry

in both NIFTY NUGGET and PROUD SPIRIT, and in the counterpart REX BRAVO exercises. The private sector of the construction industry was not invited to participate in the exercise. Consequently, no one could assess the impact of civilian competition for engineering services, construction equipment, materials, labor, and other scarce resources. A mobilization of the Air Force in the CONUS would necessitate increased facility or plant engineering contracts at our bases, since most of the civil engineering military forces would be deployed to the wartime theater. Our civilian force would remain to operate the CONUS bases. Industry mobilization for such services is also a distinct possibility in an extended period of conflict. With the deployment of our degreed officer engineers, the need for architect and engineer services could also increase.

As an example of industry involvement, let's look at one specific area — dependents. We now have about 250,000 people in the Air National Guard and Air Force Reserve. While the Guard and Reserve are in a non-

mobilized status, their dependents don't generate requirements on the support system. However, under mobilization, these dependents would by definition be dependents of active duty service members. This would entitle them to use the same medical, commissary, exchange, and other base facilities as our current active force dependents. Our support structure is not sized for this population, which could add about 365,000 people to our dependent community. This large increase could generate a significant surge, not only within our family support structure, but a parallel requirement for added facilities operations and maintenance, as well as modification requirements. An added surge of dependents can be expected in our nearby host communities which may not be able to fully house these new occupants. This could lead to an increase in modular types of housing located on quickly prepared sites. There are additional considerations beyond the dependent surge. National mobilization could result in a system of construction priorities, favoring projects which are clearly defense related. In summary, mobilization has the potential to generate the need for some new construction and a surge to complete essential defense projects in the CONUS and will also cause an increase in the need for other contractor-provided engineering services.

Keep in mind that FEMA will be the nucleus of the cabinet level Office of Defense Resources which will determine and adjudicate questions of priority within the construction industry and make critical decisions concerning the allocation of scarce construction material and labor resources. The national goal is to coordinate a national response to mobilization — to manage the entire civil mobilization effort. We must remember that support of the Air Force CONUS sustaining force is only a part of the total requirement for the construction industry.

Total Force Readiness

In past years, Air Force leadership has emphasized the importance of civil engineering mobile teams and the need to insure their readiness to deploy in support of various operations plans. While this is perhaps the most vital part of the civil engineering mission, Air Force leadership is well aware that civil engineering support for emergency mobilization response cannot be hindered at home station. This means each base must retain the capability to provide essential operations and services to support the missions outlined above.

Current analyses indicate we already know there are too few military civil engineering personnel to meet all identified wartime theater requirements. Maximum use of the Air Force civilian work force (including contract services) is essential to provide the most effective support and meet the highest priority engineering requirements. Consequently, posturing of the base civil engineering civilian work force to provide combat CONUS support during a major conventional war overseas is recognized as the next phase in achieving force readiness.

Lt Col Eugene A Lupia is assigned to the Industrial College of the Armed Forces, Ft Leslie J. McNair. He holds civil engineering degrees from the Air Force Academy (1967) and at the master's level from Oklahoma State University (1968). He is a graduate of Squadron Officer's School, Air Command and Staff College and the Armed Forces Staff College.

To assure essential maintenance and services are provided, there must be a large enough in-place force remaining after deployment of mobile forces. As previously stated the primary component of this force will be the civil engineering civilian force. In some specialities and skills this component is not large enough to insure all essential tasks will be accomplished. The current planning envisions the use of emergency contract, civilian overhires, recalled retirees, as well as individual manpower augmentees from the Air Force Reserve to provide required maintenance and services.

Air Force planning now assumes commercial sources for contract and utilities will be available for an indefinite period of time and that contracts in effect will be continued. Again, based on the decisions of the Office of Defense Resources, this may not be the case. In addition, there has not been enough identification how many of the Air Force's civilian employees who are also reservists or members of the National Guard that would be subject to emergency recall. Also, there are few plans for replacing recalled members of the reserve forces.

Thus, properly sizing the wartime CONUS sustaining force has a direct effect on active duty members being available for mobilization. The major commands started determining in-place force needs with the Wartime Manpower Planning Exercise (WARMAX). Some major commands have conducted very limited tests — for example, Strategic Air Command tested two bases during GLOBAL SHIELD '80 — to determine what the size of their CONUS sustaining force should be. The data from these tests was then used to extrapolate manpower requirements for other bases in the command. These manpower requirements

have been further refined using these two assumptions:

(1) The maximum period the in-place force is expected to perform without relief is 180 days and,

(2) 60 man-hours per person are available each week.

This second assumption, when combined with increased availability rate as a result of decreased military duty, leave, and training requirements, provides us the major boost in man-hours that compensates for the drastic loss of civil engineering military personnel while enabling the remaining force to continue essential services.

Wartime Force Structure

Due to the ever-changing nature of the wartime threat, there is a continual evolution and refinement of the force structure. The present civil engineering force structure was postured on the basis of the refined Joint Contingency Construction Requirements Study or JCCRS II. This three-year study was conducted by the JCS with inputs from the services' functional managers. It was based on the DOD-approved major-minor conventional war scenario and defined gross, overall wartime engineering requirements. JCCRS II showed a significant shortfall in Air Force engineering forces and very likely prevented proposed personnel reductions. JCCRS II was used to posture current mobile teams identified in the AF War and Mobilization Plan which war planners use from which to select forces to support various operations plans. Civil engineering leadership relied heavily on the results of JCCRS to support engineering programs and identify manpower shortfalls.

The Air Force Manpower Engineering Agency (AFMEA) was asked to evaluate and validate wartime requirements and the composition of mobile team posturing. The objective was to get wartime requirements and mobile team posturing validated by manpower officials. If this occurs we can compare peacetime posture and wartime posture and make necessary changes to the current force structure.

In October 1981 the Air Force Engineering and Services Center provided AFMEA with revised requirements for the CONUS sustaining force. These requirements were based on inputs from the major commands. AFMEA is now in the process of developing a correlation/regression analysis of the submittals to determine civilian wartime requirements. The effort will lead to standard wartime manning equations and manpower tables for the CONUS sustaining force.

The Exercise Process

It is imperative these newly developed equations be tested through a validation of the manpower standards they provide. This test could take place during PROUD SABER in 1983. Selected units could actually be deployed so the CONUS sustaining force could be evaluated under more realistic conditions. Air Force and JCS planners could determine how the exercise could be constructed and instrumented. They could develop timelines and a sequence and flow of events.

At the conclusion of the exercise, results could be analyzed in detail to determine where additional changes are required and where new methods need to be developed. The exercise results could serve as the basis for the development of follow-on exercises to refine existing procedures or initiate efforts where it is necessary to make changes. We might have some items related to the CONUS sustaining force put in each of the following categories:

(1) Requires remedial action,

(2) Lessons learned, and

(3) "Noted."

There is a formal Remedial Action Program (RAP) working group which must approve all items which officially become a part of the RAP process. At this point the CONUS sustaining force problems — if there are any — would receive high visibility quickly. If there are shortfalls in civilian manpower they would be highlighted for future budget exercises.

The REX BRAVO portion of the national exercise could also be expanded to include portions of the construction industry. This would be particularly useful as the REX BRAVO 80 exercise did little to test this critical area. The REX BRAVO 80 scenario did not:

(a) Generate long-term projections of resource competition.

(b) Have industry representation to develop supply/demand data.

(c) Adequately consider OSHA and EPA restrictions.

(d) Have a common format for exchange of data on the civilian work force.

(e) Have procedures to manage the civil transportation resources.

Each of these areas would have a direct bearing on the construction industry's ability to support the CONUS sustaining force. In November 1981 a Defense Mobilization Conference was held at the National Defense University at Ft. McNair in Washington, D.C. This conference brought together leaders from the highest levels of government (FEMA, DOT, Commerce, Labor, etc.), the Department of Defense (OSD, JCS, Services) and industry to discuss mobilization issues related to the construction sector of the industrial base. The conference laid the groundwork for industry and government to provide many useful recommendations, many of which could be evaluated during a national mobilization exercise such as REX BRAVO '82. E&S

I consider the continued reliance on long and wide airfields to launch and recover aircraft as the 'Maginot Line of the Present' because both are rigid, immobile, and doomed to failure.

...Urgency. There must be a sense of urgency. And, there must be a sense of vision. We have to project ourselves into the time and place that we're thinking about, and put our professional backgrounds to work. We have got to figure what we need for the future.

-Maj Gen William D. Gilbert, USAF, Director of Engineering and Services, HQ USAF-on facilities readiness.

-Likewise, the military engineer — indeed, the entire engineering community — must contribute to continued and enhanced military readiness by active membership on the team of designers, operators and R&D personnel who develop the deployable base packages and their components and that which is necessary to repair those packages. Far in advance of new weapon system development, every effort must be made to ensure that the facilities' needs — to maintain, launch, recover, repair, and relaunch — are considered as part of our acquisition's design.

-Lt Gen Philip C. Gast, USAF, Director of Operations, Joint Staff, Organization of the Joint Chiefs of Staff-on the engineers' role in readiness.

ON THE RAZOR'S EDGE OF TECHNOLOGY

by Capt Anthony J. Kwan and Capt J.D. Wilson

Many of the solutions to the problems which face the military engineer today rely upon technologies which were conceived and developed one to four or more decades ago. If a problem arises for which current technology cannot provide a solution, it may be many years before a solution to that problem is available to the engineer in the field. By that time the first problem may be overshadowed by a larger one.

In the past the Air Force Engineering and Services community has been able, with a few exceptions, to use directly or adapt materials, methods, and equipment developed by the commercial sector to serve its needs. This sort of support can be efficient and effective for non-emergency/non-crisis requirements, but it seldom is sufficiently responsive in critical areas of air base readiness and recovery. This dependence on civilian industry is also ineffective when breakthrough solutions are required to keep pace with weapon delivery systems development and acquisition.

In order to avoid "Maginot Lines of the Future" the Air Force Engineering and Services community has been taking steps over the past several years to develop a technology base in several important areas.

The Air Force conducts research and development for several reasons:

- **To maintain superiority in basic research and enrich our technological base.**
- **To identify new systems and system improvements that meet near and long-term needs of aerospace forces.**
- **To respond quickly to a crisis-induced need for equipment or material.**
- **To examine the relative cost and effectiveness of various warfighting systems, both old and new.**
- **To discover new and alternate resources to replace those that may become unavailable.**

Research and development in the DOD is divided into five budget elements for funding and management. They range from research to management and support:

- **Defense Research (6.1) is scientific study and experimentation directed toward increasing knowledge and understanding in those field of science related to long-term security needs.**

- **Exploratory Development (6.2) includes all efforts directed toward the solution of broadly defined problems, short of major development programs, with a view of developing and evaluating technical feasibility.**

- **Advanced Development (6.3) includes all projects that move into the development of hardware for test. The prime result of this type of effort is proof of design concept rather than the development of hardware for service use.**

- **Engineering Development (6.4) includes development programs in which the item is being engineered for service use but has not yet been approved for procurement or operation.**

- **Operational Systems Development (6.4) includes R&D efforts directed toward the development, engineering and test of systems, support programs, vehicles and weapons that, unlike items under engineering development, have been approved for procurement and service employment.**

- **Management and Support (6.5) includes efforts directed toward support of installations or operations required for use in general research and development.**

In terms of these categories, all research, exploratory development and a portion of advanced development are considered technology base activities. Technology base is the foundajective of preventing technological surprise.

One objective of the technology base effort is to solve specific problems. Another is to provide new revolutionary technology. These two support the third objective of preventing technological surprise.

Each year in February or March the Air Force Engineering and Services community's corporate leaders meet for the Research and Development Requirements Council (RDRC) which reviews ongoing and planned Air Force R&D efforts related to Air Force Engineering and Services needs. The council also identifies current and future deficiencies requiring R&D for possible solution. An additional source of direction for civil engineering technology base efforts are Statements of Operational Need which have been validated by HQ USAF.

The Air Force civil engineering technology base program is carried out by three different organizations: the Air Force Office of Scientific Research, the Civil Engineering Research Division of the Air Force Weapons Laboratory (AFWL), and the Engineering and Services Laboratory (ESL). In 1980, the Air Force Office of Scientific Research (AFOSR) initiated a basic research program for civil engineering. In FY81, Air Force Systems Command established and funded a civil engineering technology exploratory development (6.2) effort at ESL. This effort joins two other well established exploratory development thrusts. One of these is the environmental aspects of the advanced weapons systems program which is conducted by the Environics Division of ESL. The other is AFWL's exploratory development related to the design and assessment of blast and shock hardness of facilities, associated equipment and appurtenant fixed elements subjected to nuclear explosive weapons. The current thrusts of ESL's new 6.2 program are:

- **Post Attack Launch and Recovery**

- **Airbase Survivability**

- **Pavement Technology**

- **Fire Fighting Technology**

Current emphasis is being given to near term problems. In FY81, the program was funded at $250 thousand (K) and in FY82 at $500K. Recently AFSC enhanced the FY82 program by $450K for

work in the airbase survivability area and plans to enhance the FY83 program by $1 million for the same purpose. ESL, AFWL and the Air Force Armament Laboratory (AFATL) will use the enhancement funds to work on various aspects of the airbase survivability problem.

The following are some examples of the development work being conducted under the civil engineering technology 6.2 program:

- **Development of a water compatible polymer concrete for applications in repair of bomb damaged airfield pavements.**
- **Study of blast parameters of conventional high explosive weapons with respect to developing lower cost sealed testing techniques for evaluation of structures.**
- **Study of the performance of fire suspression agents in oxygen enriched atmospheres of airframes with respect to developing better agents.**

While the benefits of these tech base efforts may not be reaped for many years, ESL is using state-of-the-art technologies to solve near-term military unique problems. A good example is in the fire technology area. The primary objective of fire technology is to develop, test and evaluate fire fighting agents, equipment and vehicles for the 13,000 active and reserve Air Force fire fighters. The full spectrum of Air Force fire protection is being studied — both aircraft crash rescue and structural fire fighting. The Air Force Engineering and Services Laboratory/Fire Technology Section is developing new and innovative equipment to insure that Air Force fire fighters can do their job under the worst environmental conditions, such as a chemical warfare (CW) scenario. Outlined below are some of the initiatives and a brief background on the importance of each.

Self-Contained Breathing Apparatus (SCBA)

The use of SCBA for fire fighting goes back to the mid-'40s. The first SCBA consisted of a 100 percent oxygen rebreather. Due to the hazards encountered in the fire fighting environment this was gradually changed to a compressed air breathing apparatus. The compressed SCBA reduced the oxygen content of the SCBA environment from 100 percent to 21 percent. The current SCBA used by the Air Force is heavy (30 pounds) and bulky. The main disadvantage of the SCBA is its short useful duration. Recent testing has shown that the present SCBA provides only 10-15 minutes of breathing air under working conditions. The SCBA currently under development is lighter (18 pounds), is smaller (3-inch wide profile), and is human engineered to fit comfortable. This unit will be fully operational in a CW environment and provides up to two hours of breathing air in fire emergency working conditions. The new SCBA is planned for operational use by 1984.

Fire Fighter Ensemble

The use of a special garment for aircraft crash rescue fire fighting dates back to the mid-'50s. This unit utilized a structural suit which had a thin, un-insulated, aluminized shell. The early '60s saw the introduction of the current asbestos proximity suit with the laminated aluminized covering. The current proximity suits (silvers) weigh approximately 14 pounds, have a life span of 4-6 months, and do not provide protection in a CW environment. In 1981, asbestos was banned for use due to its associated health hazards. New clothing is being jointly developed by the Navy and the Air Force. The entire ensemble will consist of a Kevlar proximity suit, a CW protective undergarment, and a communications helmet.

The new proximity suit weighs only eight pounds. A refurbishing kit for the aluminized coating is being developed. This kit will give the suit a 5-year life span. The CW undergarment, being developed by the Air Force Aeronautical Systems Division (ASD) is lightweight (4 ounces), and will provide full protection from gaseous and thickened CW agents. The individual fire fighter communications helmet will provide the last link for full CW protection. It will incorporate the new SCBA and also provide filtered non-SCBA air as required. The new Kevlar proximity suit will be available for use by 1983. The CW undergarment and communications helmet will be available by 1986.

Semihardened Shelter Fire Protection

The original fire protection system for aircraft hangars was the water sprinkler system. While this would not extinguish a Class B fuel fire it would reduce temperatures such that the hangar's integrity would be protected and leave the hangar intact. This was later changed to a deluge type sprinkler system which incorporated the use of protein foam and aqueous film forming foams (AFFF). These would establish a blanket over the fuel and extinguish the fire. The major drawback to these systems is that when the fire is internal to the airframe these agents can not penetrate the aircraft to extinguish the fires. Additionally, these systems utilize great quantities of water which is not always available in all global areas. The mid-'80s saw the development of liquid vaporizing agents such as Halon 1211, 1301 and 2402.

There is a difference between hangar fire suppression and some hardened tactical aircraft shelters. Current fire protection for the tactical semihardened aircraft shelters consists of 2-wheeled extinguishers with a crash fire vehicle stationed in the area. A fire detection/suppression system for

Adverse Environment Vehicle

Past and present crash rescue vehicles have used the wheel for transportation. Under normal environmental conditions wheeled vehicles are the optimum. However, the majority of aircraft crash incidents occur off the runway, in usually inaccessible areas. Development of an adverse terrain vehicle will begin in 1985. Using existing air-cushioned vehicle technology to fight fires will increase mobility and allow greater access to crashed aircraft. This vehicle will be able to quickly transition from surfaced roads to adverse environments such as water, ice, snow, and swamps. Additionally, it will be able to easily tranverse an air base after an attack; craters and debris will pass from a major to a minor obstacle.

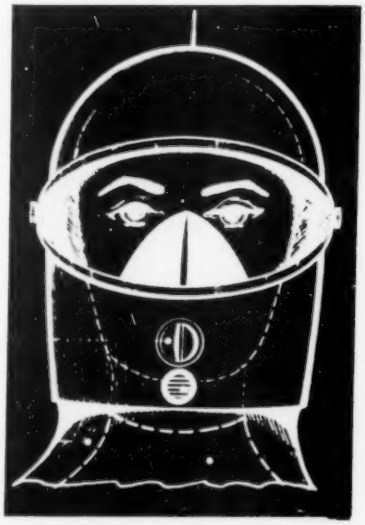
the shelters will start development in 1985. This system will be capable of detecting and suppressing any anticipated shelter fire within 14 seconds. It will be capable of discriminating between actual fires and other phenomena such as engine starts or lightning.

Rescue Tool

Current rescue tools date back to the beginning of aircraft rescue operations. The majority of these tools were manually operated pry bars, axes and mechanical cutters. Evolution of these tools brought hydraulic jacks and spreading devices. Currently gasoline engine powered friction saws, hydraulic spreaders and cutters are used for rescue purposes.

Overall the Air Force has always utilized commercially available tools for the purposes of aircraft crash rescue. A tool specifically designed for entry into crashed or damaged A/C had never been addressed. Thus the existing rescue tool weighs approximately 60 pounds, requires two fire fighters to operate, and can not be used in a hazardous environment because the power source is spark producing.

The new rescue tool under development will weigh approximately 20 pounds, be fully operable by one person, and will have a spark-suppression system so the tool can be used in a hazardous fuel vapor environment. This tool will incorporate a spreader/cutter, and a saw which functions like a router. The tool will be operational in the field by 1986.



Fire Fighter Vehicle Training Simulator

Fire fighters have always utilized live fire and operational equipment for training. Increased environmental restrictions on the open burning of hydrocarbon fuel, the cost of fuel, and the increased maintenance costs of fire fighting vehicles has resulted in restraints on fire fighter training. Therefore, the practice of using actual fire fighting vehicles for training is becoming increasingly prohibitive. Experience with aircraft simulators indicate that fire protection can increase fire fighter proficiency and save money. As with all simulators, the most important aspect of the system will be realism. This new simulator will incorporate audio, visual, motion, model board, and theatrical smoke and lighting techniques tied into a computer to provide real time, realistic responses to the driver inputs. The simulator will be capable of training fire fighters in fire suppression, vehicle operations, and tactics. Training in a wartime scenario will be easily accomplished by changing the hardware associated with the system. The simulator will be in operation by 1985.

Capsulized Extinguishing Device

When computers first came into the Air Force inventory they were protected with water sprinkler systems. As the computer systems were upgraded the fire protection system remained unchanged. The early '70s saw the change to Halon 1301 total flood systems. A capsulized extinguishing device is currently undergoing development. This device will be capable of unsupervised extinguishment of fires in their incipient stage. It will have the capability of activating the building fire alarm and alerting the fire station. By installing the devices in individual computer cabinets and trash recepticals it will be possible to reduce fire protection installation costs by 90 percent. The device will be available for use by 1985.

Microprocessor Guided Turret System

The late '40s saw the development of protein foam air aspirating hydraulically-operated turrets. The late '60s brought the transition from protein foam to AFFF. The latest testing indicates that non-air aspirating turrets are 30 percent more efficient than air aspirating turrets and have a maintenance reliability of 95.6 percent versus 66.4 percent for air aspirating turrets.

Now the efficient application of AFFF is being investigated using non-air aspirating turrets. Utilizing infrared sensors a microprocessor can detect a fuel fire, scan the width of the fire, automatically apply agent and stop agent application. This will insure the optimum placement and discharge of AFFF. This system will be available by 1984.

Fire Fighting Structural Penetration for Large Frame Aircraft

The introduction of vaporizing fire fighting agents (Halon) allowed the fire safing of even high cubic volumes of enclosed area. Unfortunately, these agents are still not capable of penetrating an airframe to extinguish internal aircraft fires. A penetrator device is currently being developed. This device will be capable of one-person operations. It will be able to penetrate up to 14 inches of material and still apply fire fighting agent into the aircraft structure. This will allow an airframe to be filled with agent, extinguishing the internal fire without forcing firemen inside the burning aircraft.

Using state-of-the-art technology to develop solutions to near-term military unique problems and developing technologies directed at solving future Air Force Engineering and Services problems will result in an increased mission capability. The increase in fire protection capability will insure survivability of valuable personnel and equipment throughout the Air Force now, and in the future. Continued research and development, in this and the other areas outlined, is essential to continually improving our survivability. E&S

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Capt John D. Wilson is currently assigned to the headquarters of the Air Force Engineering and Services Center, Engineering and Services Laboratory. He received his bachelor's degree in civil engineering from Kansas State University and is completing requirements for a master's degree in geotechnical engineering from Georgia Institute of Technology. He is a member of the Society of American Military Engineers, American Society of Civil Engineers, and the Transportation Research Board. He previously served at San Vito Air Station, Italy as the civil engineering chief of design.

WAR & PEACE

A Firefighter's Perspective

by SMSgt Donald W. Warner

The title of Leo Tolstoy's epic novel, "War and Peace," offers a departure point for analyzing the survival of the United States Air Force as an instrument of defense in two vastly different worlds. There is reasonable assumption that we train to win the peace and hope that we can win the war if it comes.

No area of the Air Force is more acutely affected by the transition from peace to war than fire protection. During peacetime, the manhours judged necessary to fight fires and respond to crashes are carefully woven into manpower and budget pictures that frequently seem austere, and are allocated at a rate of minimum adequacy. The dollars needed for equipment and facilities are tightly administered, and when available reflect the demands of the peacetime Air Force.

Truth is frequently harsh and discordant, but it remains the truth. We are faced with a unique challenge. If and when the next war comes we will enter with slender resources, escalating demands, and insufficient manpower. And, only by careful planning and intensive scrubdown and analysis can we gain the optimum from the resources which we have available. Our fire fighters are faced with a closer proximity in our overseas facilities, increasing their perceptions of the potentials of conflict somewhat proportional to the distance to the nearest enemy base. The closer you are, the more aware you should be that wars are hazardous to your health. Among the hazards of war we can expect blast damage, fires, casualties, damaged equipment and facilities, and greatly altered priorities and response capabilities. While this may seem obvious for our fellow fire fighters overseas, there are ramifications of war which affect us at home as well. These effects include relocating uniformed fire fighting personnel overseas, leaving critical facilities protected by fewer people. Many facilities at home are old and prone to the damages of fires, accidents and

other threats. At a time when the flightlines of our aerodromes will be launching more aircraft in a week than in some years, our people will be tied to the essential mission, leaving some facilities at risk.

Can we survive? The thrust of this article is to examine this question from a fire fighter's viewpoint, and propose a few tentative conclusions.

During Korea and Vietnam we were not faced with an agressive enemy air force capable of sustaining a persistent attack on our aerodromes. This enabled us to concentrate on an offensive dedication of our aircraft, with the fire fighters primarily concerned with crash and rescue.

In Vietnam the best example of agressive enemy action came during the Tet Offensive. Our bases were hit with devasting fire, not from aircraft, but from ground oriented ordnance. Mortars, rockets, sapper charges and rifle fire inflicted heavy damage.

In examining the fire fighters' responses during Tet, we found that priorities were decided with each new situation, non fire fighting forces were employed in damage control actions and in base security response, and the combined effects of blast, shrapnel and fire caused extensive damage.

Our challenge is to begin planning and to take actions now envisioning a highly capable Air Force at the disposal of a potential adversary whose battle plan will certainly include denial of our launch, recovery and operational platforms—our airbase facilities. This denial may be executed through the use of tactical aircraft capable of employing an impressive array of ordnance, and even from tactical missiles. The effects will be large-scale blast and debris damage, alteration of the air that we breath with toxic chemicals or radiation, and extensive fires.

Fire Protection During Conflict — Can We survive?

Fire serves a very useful purpose during conflict. It destroys an enemy's production capability. As such, we must expect that fires will occur during any armed conflict. We must alter our normal methods of providing fire protection, accepting certain losses and concentrating on others. To be able to provide the necessary fire fighting and rescue services to protect our war machinery requires planning. This important matter cannot be left to chance.

Pre-Positioned Forces

We depend on our pre-positioned forces to minimize an enemy attack until reinforcements arrive. Accordingly, the fire department is expected to provide the fire fighting and rescue services during the initial period of conflict. To accomplish this:

- Adequate manpower and equipment must be available.

• AF resources must be prioritized at each installation and fire fighting and rescue services provided to the most important resource first. We must prioritize the facilities, aircraft, and materials to which we will allocate our capabilities. Other facilities and equipment can be ignored if necessary.

• Alternate sources of water must be identified. Dependence on the base water distribution system is not a good idea because it may be easily interrupted.

• Fire fighters must be adequately protected. And we must provide the training and equipment so the fire fighter can survive an enemy attack.

• Fire equipment should not be grouped together. We must plan to disperse and camouflage fire fighting equipment during enemy attack. Fires are intentionally started by the enemy and fire fighting equipment makes excellent targets.

Reinforcements

Contingency forces to supplement pre-positioned forces must be planned. These personnel have been identified but there must be enough personnel available to meet the contingency requirements. In this same area, it would be ideal if the order of deployment and the expected location of deployment could be known. This information would permit us to train our personnel in the proper tasks and permits forethought concerning the CONUS installation from which contingency forces will be taken.

Another critical consideration is the capability of contingency forces to do the job. Fire chiefs in areas of conflict will have problems keeping the fire fighting and rescue forces organized in a combat environment. What they certainly do not need are untrained fire fighters sent to supplement existing forces. There will be no time to provide technical training for fire fighters in basic skills such as fighting fires and operating available equipment. They already must be capable of performing these tasks. Untrained fire fighters will be liabilities instead of assets. Fire fighters are a vital part of contingency forces and their proper training must be assured. Failure in this area can have direct negative impact on our ability to repel the enemy. Fire fighters must be:

• Capable of operating equipment present at the deployment site.

• Trained in self-protection in CW environments.

• Trained in fire fighting and rescue involving aircraft at the deployment site.

• Trained in fighting fires involving munitions, both conventional and nuclear.

Stateside Bases

What happens to the assets at CONUS bases after deployment? Depending upon conflict, many bases may be left with very limited protection. Personnel and equipment may be deployed to the area of conflict leaving the base with extremely limited fire protection capability. Even bases manned predominately with civilians may be similarly affected. How many civilian fire fighters are in the reserve forces and may be mobilized during a conflict?

Many CONUS bases do not lose their importance during conflict. In fact the mission of some becomes even more critical, especially those which provide repair and supply support, training for replacement personnel, etc. Obviously, the fire protection for such a vital part of our capability cannot be ignored. Planning must be done in the following areas. We must:

• Prioritize facilities, equipment and material and provide fire protection to the most "mission essential" facility, equipment or material first.

• Consider placing critical material in facilities providing the best fire protection.

• Consider dividing critical material so it is not all located in the same fire area.

• Consider additional available equipment which can be used in a fire operation. For instance, bulldozers can cut fire breaks, cranes can be used for rescue and salvage, high reach vehicles can be used to provide elevated attack lines, forestry

equipment can be used on structure fires, etc.

• Know in advance how many civilian fire fighters are in the reserve forces. We already know about military personnel but little attention is given to the idea that civilians may be activated and consequently lost to the department.

• Use the reserve forces to advantage by identifying shortfalls now, validating them against the wartime needs, and establishing individual mobilization augmentation to backfill anticipated losses to deployment of our uniformed personnel.

Fire Protection Engineering for Facilities

In addition to providing a reasonable level of fire protection for facilities and contents, and an acceptable level of fire safety for occupants, fire protection engineering for AF facilities must take contingency operations into consideration. Normally, AF fire departments are manned and equipped primarily to provide fire protection and rescue for aircraft. Minimum manning and equipment is provided for structural fire protection based on quick attack and combatting the fire while it is small. We depend enormously on automatic fire detection and supression systems and on local communities to assist in combatting large structure fires.

After deployment, local fire protection capability may be extremely limited. First priority protection goes to the primary mission and on a base with a flying mission, there may be nothing left to protect facilities. Therefore, fire protection must be built into AF facilities using noncombustible construction, installing automatic fire protection systems, and trying to limit the amount of combustibles in a facility.

Another very important (and often overlooked) aspect of fire protection engineering is analyzing the types of fire protection systems installed in the facility. Keep in mind that maintenance personnel may not be available; or those available may have very limited capability. Where automatic suppression systems are needed, we must provide the most simple system available measured in terms of both operation and maintenance. For instance, we should not install a preaction sprinkler system where a wet pipe system will suffice. The wet pipe sprinkler system will probably work with or without maintenance for a long period of time. The same cannot be said for a preaction system.

Keep in mind that the mission of the Air Force is to "fly and fight" and the charter of fire protection is to protect the assets which support this mission. All fire protection requirements, manning, equipment, engineering, training, etc., must be predicated on the wartime environment. We cannot afford tunnel vision which only provides fire protection in the peacetime situation. Planning for our contingency role must receive the highest priority.

Summary

We can and will survive, if:

• Wartime needs are the cornerstone of planning.

• We say now who goes where and begin planning for the contingencies expected for the specific wartime tasking.

• We train people for the most exact possible skills and duties expected of them in the contingency situation.

• We begin working now to insure that the fire situation is manageable through preventative location of critical items, proper grouping and dispersal of flammables and explosives, and installation of automatic fire detection and suppression systems where needed.

• Our contingency forces are

allocated properly, well in advance, with sufficient manpower resources identified to backfill deploying personnel.

• Our fire fighting and suppression equipment are appropriate to the wartime situation, carefully measured and evaluated well in advance to assure adequacy and dependability. E&S

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Directorate of Engineering and Services

Current Emphasis

a brief commentary on significant developments

ADVANCE MILITARY FAMILY HOUSING (MFH) APPLICATION FOR FAMILY MEMBERS — HQ USAF/LEEHH is coordinating IMC 82-1 to AFR 90-1. The change will allow sponsors to apply for and be assigned MFH for occupancy by family members prior to the sponsor's arrival for duty. this "quality of life" action will give family members time to become established at the new base and preclude school interruptions, while the sponsor attends enroute classes or completes mission requirements at the losing installation. (AF/LEEH, Col Ginnetti, AUTOVON 227-4490)

BILLETING - SUNDRY ITEMS —
Most billeting offices offer sundry items for sale. However, at some bases the selection has been allowed to deteriorate and the overall appearance is in disarray. We must ensure an attractive display of items is available and that we offer the most commonly needed and most popular types of items. (AFESC/DEHS, Maj Ardis, AUTOVON 970-6178)

FOOD MANAGEMENT ASSISTANCE TEAM —
Recent observations by the Food Management Assistance Team (FMAT) indicate a need for increased communications between base chiefs of services, food service patrons, and command sections. The FMAT recommends chiefs of services speak at commanders' calls and regularly brief wing and installation commanders on such topics as basic daily food allowance and food cost computations, contracting costs, P562 fund expenditures, and unauthorized use of food and services. (AFESC/DEHF, Lt Col Dooley, AUTOVON 970-6225)

AFR 146-15, FLIGHT FEEDING —
The revised regulation, dated Nov. 19, 1981, has been published and distributed to the field. This revision reorganizes support material such as schematic drawings, sample menus, sandwich productions, etc. Throughout, it updates terminology, references, and the latest philosophy regarding providing food during flight. The use of AF Form 463 to control ground support meals implements a revised system to prevent abuse in the use of these meals. (AFESC/DEHF, Mr. Townsend, AUTOVON 980-6196)

AUTOMATED FOOD SERVICE OPERATIONS SYSTEM (AFSOS) —
The U.S. Army Natick laboratories is finalizing the development of the software programs for the AFSOS. The system will be laboratory tested during April. A six month field test of the system will begin at Seymour Johnson AFB in June 1982. Air Force-wide implementation of the system is scheduled to begin in late FY 84. (AFESC/DEHF, Capt Kelly, AUTOVON 970-6199)

HARVEST BARE TRAINING —
All units (except USAFE and PACAF) selected to provide personnel for HARVEST BARE training with the 4449th Mobility Support Squadron (MOBSS) must insure that personnel sent to Holloman AFB for training are members of Prime BEEF or RIBS teams tasked to support RDJTF OPlans. All trainees should have as a minimum a two-year retainability and possess at least a 5-level skill in their primary AFSC. The training these individuals receive with the 4449th MOBSS could be critical to the success of potential contingency operations. (AFESC/DEOP, Maj Bittner, AUTOVON 970-6738)

STUDY OF INFORMATION REQUIREMENTS
is well into the system development phase. Automation concepts have been sent to MAJCOMs for their review and finalization. The study will restructure base level automation providing broader access to computer systems and better flexibility in data retrieval. Electronics processing will eliminate paper processing in the future systems. (AFESC/DEMG, Maj Golondzinier, AUTOVON 970-6390)

FACILITY ENGINEERING JOB ESTIMATING SYSTEM (FEJE) –
The test of the Facility Engineering Job Estimating System (FEJE) is showing a 50 per cent increase in planner productivity in applying Engineered Performance Standards. This program will be part of the Work Information Management System (WIMS) scheduled for implementation in FY 84. (AFESC/DEMG, Maj Golondzinier, AUTOVON 970-6390)

CIVIL ENGINEERING MATERIEL ACQUISITION SYSTEM (CEMAS)
has been approved for prototyping at Tinker AFB in the third quarter of FY 82. It utilizes the best features of present support systems (GOCESS, COCESS, LOGCES, etc.) coupled with state-of-the-art minicomputer technology and will provide a responsive and cost effective supply system. (AFESC/DEMG, Maj Harvey, AUTOVON 970-6386)

ENGINEERED PERFORMANCE STANDARDS (EPS) –
The Preventive/Recurring Maintenance Handbook (AFM 85-59) has been approved for public release. This handbook will be used to apply work performance standards to the recurring maintenance program (RMP). To establish a requirement, bases should cite Publication Bulletin 22, dated October, 1981. (AFESC/DEMG, Mr. Gray, AUTOVON 970-6378)

STANDARD PRACTICE PROCEDURES FOR RECYCLING PAVEMENTS
The final draft of a new Chapter 6 to AFM 88-6 is complete. The new chapter discusses both asphalt and concrete with illustrations and examples. The publication date will depend on processing time required by HQ USAF/DAP. (AFESC/DEMP, Mr. Greene, AUTOVON 970-6334)

AIR INSTALLATION COMPATIBLE USE ZONE –
Current emphasis is on complete and accurate collection of applicable aircraft operation data. This is best accomplished by coordinating the data collection between the BCE and the airfield manager. Proper documentation of the data is important. We must be able to verify it at a later date. (AFESC/DEVC, Capt Laras, AUTOVON 970-6227)

HISTORIC PRESERVATION –
HQ USAF/LEE on Jan. 4 issued a policy letter on historic preservation directing all commands and installations to appoint a Historic Preservation Officer. It provides guidance in nominating historic/archaeological sites and structures and, references a source of technical assistance. The AF regulations governing historic preservation are in preparation with expected publication in the fall of 1982. (AFESC/DEVN, Ms. Scott, AUTOVON 970-6236)

HISTORIC PRESERVATION TRAINING –
A training course for the individuals named as the command and installation Historic Preservation Officer is being planned for October. Course emphasis will be on historic preservation management. Several sessions will stress ways to coordinate and consolidate surveys to assure maximum cost savings. (AFESC/DEVN, Ms. Scott, AUTOVON 970-6236)

FISH AND WILDLIFE MANAGEMENT –
The new tri-service Fish and Wildlife Management Technical Manual, AFM 126-4, has been published. Bases with fish and wildlife resources should obtain the manual through the Publications Distribution Office. (AF/LEEVXN, Mr. Clark, AUTOVON 227-2039)

OCCUPANT LIABILITY FOR DAMAGE TO FAMILY HOUSING –
Public Law 96-418, dated Oct. 10, 1980, changed the requirement for assessing liability for damage to housing units from gross negligence to simple negligence. Interim message change 82-1, Feb. 1, 1982, to AFR 91-1, Sept. 12, 1975, implements this change. (AF/LEEH, Mr. Weber, AUTOVON 2254-0466)

RED HORSE IN THE SUDAN

by Capt Steven H. Wiebke

Our national survival in many ways depends upon our abilities to interact with friendly national forces in many diverse areas of the world. Only at the level of major international exercises, such as BRIGHT STAR, can the total team effort be evaluated. Engineering and Services participation in BRIGHT STAR included the 819th Civil Engineering Squadron/Heavy Repair based at Wethersfield, United Kingdom. *Editor.*

This year's Bright Star was a Rapid Deployment Force joint service exercise that tested our response capability in the Middle East. Although the entire exercise encompassed up to five countries for almost two months, our experience was centered around one country for three memorable weeks.

Deployment

The purpose of all of our extensive mobility training came to light shortly after the tasking was directed by HQ USAFE. At that time, early in November, 25 men of the 819th Civil Engineering Squadron Heavy Repair (RED HORSE) went into action. The excitement was intense as we prepared for our first "real" exercise since our relocation to RAF Wethersfield from McConnell AFB, Kan in 1979.

The time between notification and deployment went quickly as we packed all our mobility gear, tool boxes and readied all the equipment. We deployed through RAF Mildenhall to a preliminary stop at Camp Darby, Italy.

At Camp Darby, all of the Harvest Eagle equipment that was to be deployed was inspected, inventoried and prepared for loading. The inevitable came when we loaded our C-141B with more than 66,000 pounds of cargo and departed Pisa commercial airport.

Unconventional Warfare

Our mission was to set up an Air Force tent city, provide encampment engineering support and operate a field kitchen for all personnel of the Joint Unconventional Warfare Task Force. Accepting our challenge, we landed in the Sudan just before noon on Thanksgiving Day. From the moment our aircraft came to a stop, the famous RED HORSE "can do, will do, have done" attitude prevailed. After being greeted and escorted to the encampment area by the Air Force "base commander," we went to work.

The area contained one abandoned lean-to building, surrounded by virtually barren desert sand. Six hours after we touched down, the abandoned lean-to was transformed into a field kitchen. We served a hot Thanksgiving meal to the entire camp. On that same afternoon, the entire Air Force tent city was sited, layed out, and eight tents erected.

In the following days, power production people set up our MB generators and light-all. Electricians installed lights in tents and wired up the field kitchen. Our reefer man had his hands full with his ice machine and refrigeration unit. And in our spare time, when not working in our specialty, we erected 31 tents. Panic struck when we found out that the wooden and metal stakes that were part of the kit were unsuitable for the soil conditions we encountered. The wooden posts penetrated the beach-like sand with no problem. However, just beneath the surface was a highly-compacted, clay-based soil. The wooden stakes shattered. But by picking up on the Army's method of using long steel fence posts for stakes, we shortly solved that problem after "acquiring" some steel of our own.

After the tents were up, the craftsmen took on several projects. The carpenters built three latrines (55 gallon drums cut in half, with toilet seats afixed, with privacy provided by a wooden frame, open air outhouse) work tables and even a movie screen for MWR. Wood was scarce and had to be used from the limited supplies of each participating service. Army, Navy, Marine Corps and Air Force units were involved. The final scraps of two-by-fours were used to make signs for a six-mile athletic course, which the Army commander wanted for main-

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taining the physical conditioning of his troops. The camp was almost home when we built two flagpoles and hoisted "Old Glory" and the Sudanese flag.

For the first five days of the exercise, until the erdlator was set up by the Army, we supplied the camp with potable water. Our medic and water/waste man took care of testing, treating and transporting all the lister bags throughout the camp. Fortunately, we were given access to a local water supply just a quarter-mile from the camp. After the Army set up their erdlator and shower units, water buffaloes were used for our potable water supply. Our people assisted the Army in the erdlator operations and water delivery from that point on.

Due to the insect-ridden environment (mostly gnats and mosquitoes), our entomologist had his hands full. Upon instructions from the camp physician, the latrines, field kitchen and shower areas were treated every day. Most of the chemicals and insecticides that were used had to be acquired from Germany as their use was restricted in our home country, England. Although we seemed to be fighting a losing battle most of the time, we kept the bugs to a reasonable level of annoyance.

The field kitchen operation was a challenge in itself from the start. Daily maintenance to the ice machine, refrigeration unit, generator and cooking equipment kept our mechanics going. Some of the equipment was new in the ship

Local laborers had excavated a dump area for the camp. Further into the exercise, the trash dump site was getting out of hand, so our heavy equipment operator borrowed a Sudanese front-end loader to backfill the area. Shortly after that, we were involved in something that we never expected. Requested by the Sudanese Engineering Corps, we set up maintenance and operations training for five American-built pipeline ditchers. In two days we had 18 Sudanese troops able to operate and maintain their brand new American equipment.

Once the camp was fully established, we concentrated our efforts to the continued operation of the field kitchen and normal base civil engineering duties. With the generators running continuously, all of our people were on call throughout the night, ready to repair lighting and generator problems.

The exercise drawdown started with us hosting a massive bar-b-que for 550 people. The tents came down so much faster than they had gone up just a few weeks prior. All the equipment was cleaned, packed and palletized for our long-awaited exodus. In a day and a half, all of our tents, cots, field kitchen equipment and mobility gear was transformed to eleven strapped-down pallet loads. We departed the 100° Bright Star desert and arrived, many hours later, in a rare English snowstorm.

This year's Bright Star exercise was a re-

ping container when we loaded up. MOGAS and diesel fuel was refilled into jetty cans and two 45-gallon rubber bladders daily due to the uncertain availability of local supplies. Five days into the exercise we went from one to two hot meals a day. As we had as many as 550 people at a meal, our six cooks, augmented by other members of the team, accomplished a monumental task. Their expertise in the creative preparation of B-ration meals won constant praise from all members of the camp.

sounding success for all participants, but especially for the men of the 819th RED HORSE. The experience that we acquired prior to and during the deployment was unrivaled. All of our prior mobility exercises and field training proved to be invaluable preparations. Functioning as one integral team, we met the challenges and accomplished the mission in true RED HORSE tradition. Can Do, Will do, Have Done!! E&S

worth noting

BENNETT'S BOMBER READY FOR TRAINING

Bennett's bomber is all fired up when it works—but it never flies. Actually, it's a mockup of a C-130 at Keesler AFB, Miss.

The 3380th Civil Engineering Squadron (CES) recently completed construction of the new C-130 fire training area near Keesler. The project was nicknamed "Bennett's Bomber" because Joseph D. Bennett, the associate civil engineer, 3380 CES, conceived the idea of building a C-130 mockup utilizing a railroad tank car as a fuselage. The excess railroad car was obtained from Fort Polk, La., through the efforts of Richard Kimball and the Defense Property Disposal Office.

Conversion of the tank car to a C-130 mockup was a joint project of civil engineering and the 3380 Field Maintenance Squadron. In addition to making the tank car resemble the exterior of the C-130 with wings, engine nacelles, and a tail section, there is also a cockpit layout where fire fighters can practice engine shut down procedures and the extraction of dummies from the crew members' respective cockpit positions.

Site preparation includes 2,500 feet of pipe necessary to provide fuel. Also, added were fuel pumps and storage tanks. A total of 1,620 cubic yards of fill gravel was capped with 300 yards of structural concrete. There are 744 cubic yards of shell gravel on top of the concrete.

Bennett's Bomber took its maiden flight on Oct. 28, 1981, and as would be expected, crashed shortly after takeoff. Flames soared 60 feet in the air and temperatures reached 2,500 to 3,000 degrees Farenheit. A P2D and a P4D crash truck and 18 fire fighters arrived at the scene and extinguished the fire within 15 seconds. Immediately thereafter, fire fighters entered the aircraft and extracted the dummy crew members.

The 3380 CES said special thanks to the 3380 FMS, Base Supply, Procurement and all other organizations who helped in completing the project. (Col Max L. Hearn, BCE, 3380 CES, Keesler AFB, Miss.)

HARD SURFACE ASSURED FOR COLUMBIA LANDING

Before the National Aeronautics and Space Administration could safely utilize the alternate space shuttle landing site at the White Sands Missile Range in New Mexico, special assistance was provided by a pavements evaluation team from the Air Force Engineering and Services Center, Tyndall AFB, Fla.

The landing site is known as Northrup Strip, a specially prepared landing area located 30 miles west of Holloman AFB. Situated on an alkali flat, the area is a dry lake bed with a crust of natural gypsum. The area was once used as an impact zone for missile testing and bombing.

The AFESC team did extensive soil analysis, analyzed the load bearing characteristics of the soil, and performed load testing on the surfaces of the runways. A major challenge was identified. Impact craters created by various ballistics warheads and bombs over the years were filled with naturally blown surface soils mixed with subsurface crater residue from explosions and impacts.

Identification of the soft spots in three surveys by AFESC teams permitted NASA to rebuild the load-bearing condition of the runways to accept the 200,000 pound landing weight of the shuttle and the combined nearly-740,000 pound weight of the shuttle and its modified Boeing 747 transporter.

(See "Project Touchdown: Lending a Hand," by Maj James I. Clark, May, 1980 in the **Quarterly**. The author is now a lieutenant colonel assigned to USAFE/DEM.)

JONES GETS AWARD

The board of directors of the Professional Housing Management Association, Norfolk, Va., has awarded its highest honor to H. Dean Jones, chief of the housing management division, Military Airlift Command.

Jones received the award for "exemplifying professionalism in all phases of housing management during the year," according to Billyray E. Ring, chairman of the association's board of directors.

ENGINEERING AND SERVICES OFFICIALLY MARRIED

Air Force Engineering and Services have been merged into one family for more than a decade, but Capt Susan Christensen and Maj David Cannan, both Headquarters USAFE, made it official when they were married Jan. 9 in Strasbourg, France.

Susan, a former command billeting officer with 11 years in Services, now serves as an assistant executive officer to Lt Gen Robert W. Bazley, vice commander in chief, HQ USAFE. Dave, a civil engineer with 11 years, is executive officer to Brig Gen Sheldon J. Lustig, DCS/Engineering and Services, USAFE. (USAFE DEPD, Capt David E. Amthauer)

GIEGENMILLERS 3

"Giegenmiller, David."
"Here."
"Giegenmiller, Earnest."
"Yo."
"Giegenmiller, George."
"Back here."

That was part of the role call on a blue Air Force bus in Anchorage, Alaska, this past summer. And wherever the civil engineers from the Alamo City are, the Giegenmillers are there in full force.

For the past six years all three brothers have been part of the Air National Guard, 149th Civil Engineering Flight, San Antonio, Tex. There used to be a cousin by the name of Giegenmiller in the same Guard group, but he got out.

Earnest said, "I'm really glad we all got into the Guard unit. I got to know a brother that was just too much younger than me. But now we are all grown men and the work and good times have made us a lot closer than we ever were."

During the two weeks of active duty every year, the three brothers really stick together. To their wives it is a loss of their mates for two weeks, but for the three husbands it's 15 days of labor and leisure to be relished until next year's deployment to another spot on the globe.

All three of them have worked on construction projects in Utah, Florida and Alaska. Earnest and David went on their two weeks of active duty one summer in Germany and that is where the two oldest brothers discovered the tradition of their name.

Giegenmiller. Now that is a good German name. So the two brothers should have been right at home in Frankfurt, Germany. Right? Wrong! These Giegenmillers from San Antonio speak fluent spanish, not a word of german. So when they got lost in Frankfurt they had more trouble than most tourist because of their name. When the local Germans found out that their names were Giegenmiller, the locals insisted that these fellow Germans speak german. The San Antonians got little help finding their way back the base.

AFCOMS GETS NEW CC

Maj Gen George C. Lynch is the new commander of the Air Force Commissary Service (AFCOMS). He succeeds Maj Gen Charles E. Woods, who retired.

General Lynch has been assistant comptroller of the Air Force for accounting and finance; commander of the Air Force Accounting and Finance Center and assistant director of the Defense Security Assistance Agency for Security Assistance Accounting in Denver, Colo. since June, 1979.

BILLETING CONFERENCE HELD AT TYNDALL

The first Air Force Worldwide MAJCOM Billeting Managers' Workshop was held at the Engineering and Services Center, Mar. 22-25, 1982.

In addition to MAJCOM attendees, representatives from the Army, Navy and Marines also participated in the workshop.

Attendees discussed almost every aspect of billeting management and visited the automated front desk operation at Eglin AFB.

By all accounts, the workshop was highly successful and it is hoped that it will become an annual event. (AFESC/DEHS, Maj. Ardis, AUTOVON 970-6178.)

PLAN NOW FOR FY73 AFROTC/ATP

This summer there will be nearly 900 AFROTC senior cadets involved in the Advanced Training Program (ATP). The ATP was implemented in fiscal year (FY) 1977 to give highly qualified cadets a meaningful, individually prepared Air Force orientation. Engineering and Services organizations should make their requirements known this summer for FY 83. Requirements are channeled and consolidated through monitors within military personnel organizations at the MAJCOM/SOA level.

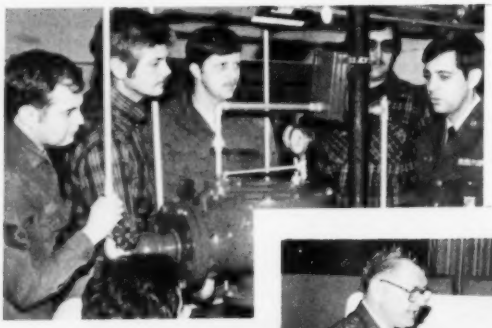
Cadets selected for ATP are assigned to Air Force bases for either a two- or three-week training period. Every effort is made to place the cadets with active duty host officers in jobs similar to those they expect to enter after commissioning. Cadets are competitively selected for ATP based on their achievements in Air Force ROTC academic and leadership programs, field training performance, and demonstrated officer potential.

A major advantage of ATP is the opportunity to interest highly qualified cadets in pursuing E&S careers. Otherwise, many may elect other career choices unless there is proper exposure and orientation before graduation and commissioning.

ATP was designed to provide the cadet specialized career orientation, with an opportunity to experience leadership, human relations and management challenges encountered by Air Force company grade officers. The program also gives participating cadets the opportunity to become familiar with the Air Force "way of life." At the completion of ATP the cadet should have a greater appreciation of the duties, problems, responsibilities, and training which he or she will encounter after graduation and commissioning as a second lieutenant.

worth noting

Winning Efforts



SSGT DANIEL WARDEN, NCO of the year, sergeants up to technical sergeants.

PHIL MCDONALD, civil engineering manager of the year for 1981 through grade GS-11.

SMSgt CHARLES DITSWORTH, 1981 Bordner award category one power plants.

MSGT HENRY J. O'NEILL, 1981 NCO of the year, master sergeants to chiefs.

BERTRAND J. BAUER, 1981 award for civilian meritorious achievement in civil engineering.

Engineers Week Awards Luncheon February 26, 1982

COL RICHARD SCRAFFORD, Curtin Award.

SMSGT DENNIS WARD, category two, 1981 Bordner award.

SMSGT DENNIS MCAVOY, 1981 Goddard Medal.

LEONARDO BARELA, civil engineering manager of the year with a grade higher than GS-11.

LT COL H.L. WHITING, 1981 outstanding services manager of the year.

FIRST LT ROBERT HENKEL, 1981 military meritorious achievement award.

DAVID CIARDELLI, 1981 Bordner category two heating plant award.

CAPT PETER GLOEBER, 1981 Bordner award for the category one heating plant.

SRA JODY PADGETT, outstanding services technician of 1981.

MSGT GROVER KEITH, outstanding services superintendant for 1981.

CAPT JAMES MITCHELL, outstanding services manager for 1981.

CAPT RICHARD DOUCETTE, 1981 USAFE Inkeeper Award.

worth noting

continued from page 41

E&S TECHNICAL TRAINING REVIEWED

At the October 1982 Program Review Committee for Engineering and Services technical training the MAJCOM / DEs expressed concern with the training provided our people.

This concern was based on imputs from senior NCOs in the field.

AFESC was tasked by the PRC to conduct individual training reviews on each Engineering and Services AFSC.

To accomplish this, each MAJCOM has volunteered to chair certain reviews. Committee composition consists of a chairman and no more than four additional people who have expertise in the AFSC to be reviewed.

The committee is served by AFESC and by technical training consultants. Each committee is charged with reviewing all training provided within that AFSC and with identifying future training requirements.

To do this, the committee reviews the current work center descriptions, specialty descriptions, specialty training standards, and course training documents. With the thorough review complete, a report of committee findings and recommendations is prepared. Each MAJCOM will review and comment.

Once the document is finalized, AFESC will staff it with appropriate agencies to insure changes are pursued. Completion of reviews is expected in October 1982 and all recommendations should be staffed by early 1983.

The product of this tremendous effort should result in our trained craftsmen being better able to accomplish the maintenance tasks they encounter in the field. (AFESC / DEMG, SMSgt Trueblood, AUTOVON 970-3397)

CIVILIAN PERSONNEL EMPLOYEE CLASSIFICATION APPEALS

E&S employees should be aware that when they initiate a classification appeal to the Office of Personnel Management (OPM) they may have an impact on their counterparts at other bases throughout the Air Force.

Some employees in the past have included in their appeal package the grade levels of employees in similar jobs at other bases who are holding a higher grade than they do.

Prior to March 8, 1981 the OPM would inform them this has no bearing on the issue and that OPM is only concerned with the appellant's position. OPM policy for this type of action has now changed.

The travesty that now can occur is that the employee appealing may not overturn the original decision, whether it be the status quo or a downgrade, but OPM can mandate Air Force civilian personnel to review the positions that are similar to the one being appealed.

As you can imagine this can have far reaching effects.

The bottom line is that if a position is being appealed the incumbent should appeal their own position's duties and responsibilities.

If the individual elects to include data on other positions then they had better do their homework. A lot of E&S positions operate in a fairly uniform manner, however, there are a number of local situations, peculiar to a given base/MAJCOM, that may not be present in their own position. These peculiarities are given weight in the classification of the other positions.

This classification appeal information is available for review at your local CCPO. Refer to Federal Personnel Manual (FPM) Chapter 511, Appendix C. (AFESC/DEMG, Mr. Gibson, AUTOVON 970-6384)

PLAN NEXT YEAR'S SNOW REMOVAL

Before dismissing the past snow removal season as a bad dream, take advantage of recent experiences to plan for next year.

AFR 91-15, Dec. 17, 1981, discusses post-season actions required to maintain an effective snow removal program. Scheduling of equipment overhauls, restocking of materials and spare parts, programming of required maintenance and repair of airfields and roadways and revising of local regulations and operating procedures are all best accomplished while memories are still fresh.

Identify training requirements early. Training films are available through the base film library and a formal mobile training team course, J4AST 5515-012, is also available.

Plan now and make next snow removal season a less chilling experience. (AFESC/DEMG, MSgt Shier, AUTOVON 970-6399)

1982 HENNESSY FOOD SERVICE COMPETITION

The dining halls of George Air Force Base, Calif., and the Airman's Dining Hall at the U.S. Air Force Academy, Colo., have won this year's awards as the best dining halls in the U.S. Air Force.

The awards are symbolized by the Hennessy Trophy, awarded each year by the national food service industry.

George AFB won in the multiple unit category with more than one dining hall on the installation, while the Air Force Academy won in the single unit category.

Keesler AFB, Miss., took second place in the multiple unit category, and the 6940th Electronic Security Wing at Ft. Meade, Md., was the runner-up in the single unit category.

Dobbins AFB, Ga., won in a special category for Air Force Reserve dining halls.

The winners were selected from dining halls throughout the Air Force. Other nominees were:

Single Category

Bolling AFB, D.C. (MAC)
Cheyenne Mtn Complex, Colo. (ADC)
Hanscom AFB, Mass. (AFSC)
Malmstrom AFB, Mont. (SAC)
Yamanlar Inst. Turkey (USAFE)
Galena Airport, Alaska (AAC)
Bergstrom AFB, Tex. (TAC)
Hickam AFB, Hawaii (PACAF)
Randolph AFB, Tex. (ATC)

Multiple Category

Barksdale AFB, La. (SAC)
Tempelhof Central Airport, Germany (USAFE)

Services:

NECESSARY FOR SURVIVAL

by Capt. David B. White

Services personnel face challenges every day, but face no greater challenge than to accomplish our mission during wartime. Why is this so difficult? What will change from the way we do our job every day? The key word is survivability, not only the survivability of the facilities, foodstuffs, equipment, etc., but the minimum level of Services support to meet continuing survivability requirements for our personnel in the areas of food service and billeting. We are additionally faced with carrying out our mortuary affairs mission.

Completely different Services challenges will be faced in wartime when compared to our current peacetime role. The emphasis will shift from many of the "nice-to-have" aspects of programs in the various Services areas to the "must-have" aspects. In wartime concern over "quality of life" food service will give way to concern over providing basic meal support, including the use of operational rations and field kitchen produced meals. In peacetime we place an emphasis on dormitory/transient facilities excellence. In wartime, priorities will be reduced to concern over a safe, warm, dry, clean place to sleep or live.

What can we do to help promote our chances of survival? What kinds of problems do we expect to face? Let's look at the immediate post-attack situation and how it will affect Services personnel.

Two situations will present themselves immediately after an attack. First, we must care for the casualties / fatalities and, assuming that we had advanced warning, we must attempt to evacuate the dependents or provide what help we can for them. Our responsibilities for casualty/fatality identification and processing will increase significantly. We will face mass casualties. Individual identification and processing of all fatalities may have to be streamlined to the mass fatality procedures of AFM 143-3. In this event, we would have to use temporary interment for many fatalities. This also means that a much larger than normal supply of mortuary search and recovery supplies is needed. The quantity immediately available will fall far short of that needed. Alternate sources of supplies or substitution, where possible, must be sought or used as outlined in current mortuary affairs directives.

The presence of unevacuated dependents will compound many of the Services tasks, especially food service and billeting. In addition, in the event of no available evacuation airlift we must do what we can to help reunite the dependents with their sponsors. The scope of the reunification program is very difficult to grasp. Services records on the assignment of emergency billeting may help to reunite families. A surge on billeting and food service requirements as a result of dependents is to be anticipated, especially in Europe where large scale Army and Air Force noncombattant evacuation order (NEO) will hinge upon the survivability and availability of suitable transport aircraft.

Within hours after the initial attack, some form of food service will be required. The base dining hall and other food service and commissary facilities probably will not survive. Much of the food will also be lost or contaminated. Therefore, the food service function will not be able to plan on using its current equipment or normal source of subsistence.

Depending on their availability, Harvest Eagle (HE) or Harvest Bare (HB) assets may be used to provide temporary kitchen and dining areas. Since it may take days for the HB/HE packages to arrive, the use of packaged operational rations may be necessary. These rations can be stored in shelters or airlifted from other bases in or outside the theater. Similarly, primary and alternate sources of potable water must be known. Some potable water may be available from shelter stocks, purification of water from natural sources, or — in an extreme case — by airlift.

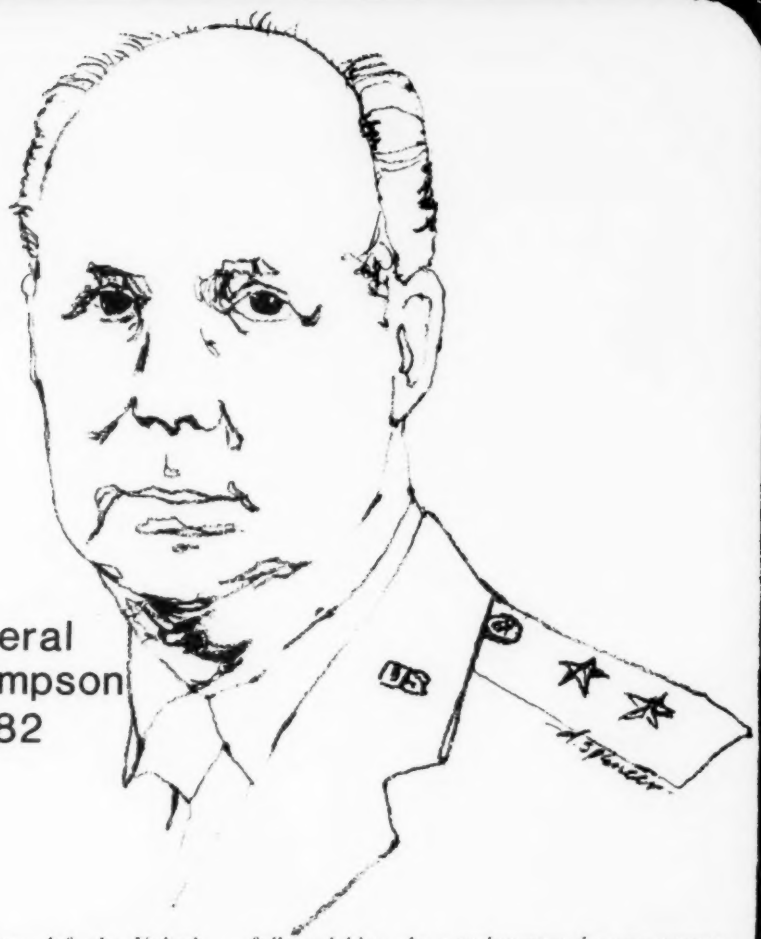
Although base utilities (electricity, sewer, water, etc.) probably will not be available, the HB/HE assets can still function because they are designed to be used in this stark environment. An alternative to HB/HE assets is the use of host nation facilities, equipment, and even food and supplies. In fact, because of the limited number of HB/HE packages, host nation facilities may become the primary alternative for survivability.

By the end of the first day after an initial attack, Services personnel will be tasked to provide emergency shelter or housing for survivors. The usual billeting facilities probably will not be usable, as these structures are not normally hardened to withstand any form of attack. However, any billeting or dormitory structures that do survive could be used for temporary lodging if residual chemical or biological agents are not a threat. In addition, spaces within some office buildings may also be converted to emergency housing to handle the overflow from the HB/HE facilities and surviving dorms. While these quarters may not meet the "normal" Air Force standards, they will certainly be welcome at the time.

After the initial attack, requirements for laundry support will probably increase daily. The level of service will vary with the existing support and changes in population. The HB and HE packages include field laundry units that may be used by Services (Prime RIBS) personnel, and host nation facilities may also be available.

These have been only the most basic actions to be expected by a Services organization. What it actually takes to insure survivability will, of course, be dependent on the severity of the situation encountered. We must make sure that base disaster preparedness plans, mobility plans, etc., address the types of situations we expect to encounter; and our people regularly train in a suitable environment at both exercise and field training schools.

Capt David B. White is a graduate of Oklahoma State University with a bachelor of science degree in mathematics. He holds a master's degree from Michigan State University in hotel, restaurant and institutional management. He is now assigned to the Air Force Engineering and Services Center in the Housing and Services directorate. He served with the Military Airlift Command as services inspector on the IG team before the AFIT assignment to MSU.



Major General Robert C. Thompson 1920–1982

Maj Gen Robert C. Thompson left the United States Air Force a legacy of professionalism, foresight and dedication. Throughout his career, in peace and in war, he served his nation with courage, dignity, purpose and an intense regard for our nation's survival.

His artform was management, his talent was vision. He worked diligently to support those who keep the Air Force on the leading edge of technology. His skill was the capacity to continually reshape the facilities of the Air Force, maintaining our capabilities to serve the nation's defense.

His singular dedication affected all of us who served with him and for him, and who have followed him. As a taskmaster, he was uncompromising. As a leader, he was unflinching. As a fellow, he was a true professional. As a friend, he was compassionate and understanding. We will miss him.

It is appropriate that his issue of the **Quarterly** *is dedicated to answering the question, "Can we survive?" Gen Bob Thompson's life was dedicated to achieving the answer through creatively conceived programs, careful analysis of the situation, and tireless prosecution of the solution. This issue is dedicated to Maj Gen Robert C. Thompson, with respect and admiration from all of us who regarded him so highly as a colleague, and so affectionately as a friend.*

MAJ GEN WILLIAM D. GILBERT
Director
Engineering and Services

Pioneering America's Revitalization:

Engineers' Week Observed in Washington

"On April 14, 1981, a spaceship landed on earth."

Maj Gen William D. Gilbert, Air Force Director of Engineering and Services, on Feb. 26 addressed nearly 300 military and civilian leaders of the American military engineering community at the Engineers' Week observance at Bolling AFB, D.C. Theme of the observance was, "Pioneering America's Revitalization."

He said, "With that dramatic climax to the maiden voyage of the shuttle Columbia, a spirit was relit in America — a pioneering spirit," made possible by a multi-disciplinary engineering effort. "Engineers **are** pioneering America's revitalization," he said.

He challenged engineers to dare to dream, with a capacity for hard work, and with pride in their achievements.

"I see engineers and architects as our best hope for translating the theories of scientists and the promises of politicians into those products and services that truly meet the needs and expectations of our people," he said. "We have many compelling things to do. On the national level and locally, in social programs and for defense, for the environment and for industry. Engineers are responding ... to the total needs of society."

He challenged engineers to preserve scarce resources by developing substitutes and using less; to protect the environment by being good stewards; and to preserve a country and a world that we cherish for our grandchildren.

"On April 14, 1981 a spaceship landed — and relit America's pioneering spirit. We need to fuel that spirit — by dreaming the impossible; by working hard at the difficult; and by sharing our pride in our engineering heritage."

Honors presented at the observance included:

•Curtin Award — 436th Civil Engineering Squadron (CES), Dover AFB, Del. (MAC), outstanding AF base CE organization.

•Goddard Medal — SMSgt Dennis J. McAvoy, structural superintendent, 36th CES, Bitburg AB, Germany (USAFE), for outstanding contributions in military troop construction and/or base maintenance. (The above awards are sponsored by the Society of American Military Engineers.)

•Maj Gen. A.M. Minton Award — Capt Ellen C. Ernst, 42nd Bomb Wing, Loring AFB, Me. (SAC), for the best article in the *Quarterly*. (The Minton Award is sponsored by the Aerospace Education Foundation, Air Force Association.)

•Civil engineering non-commissioned officer of the year (Sgt-TSgt) — SSgt Daniel R. Warden, 3340th Technical Training Group, Chanute Technical Training Center, Ill. (ATC).

•CE NCO of the year (MSgt—CMSgt) — MSgt Henry J. O'Neill, chief, readiness and logistics section, 1100th CES, Bolling AFB, D.C. (MAC).

•Civilian manager of the year (to GS-11) — Phillip McDonald, grounds maintenance foreman, 46th CES, Peterson AFB, Colo. (SAC).

•Civilian manager of the year (above GS-11) — Leonardo T. Barela deputy chief, operations, 1606th CES, Kirtland AFB, N.M. (MAC).

•Civilian meritorious achievement award — Bertrand J. Bauer, deputy BCE, Grand Forks, N.D. (SAC).

•Military meritorious achievement award — 1Lt Robert B. Henkel, 47th CES, Laughlin AFB, Tex. (ATC).

•Outstanding services technician — SRA Jody C. Padgett, 321 Services Sq, Grand Forks, N.D. (SAC).

•Outstanding services superintendent of the year — MSgt Grover F. Keith, food services superintendent, Ramstein AB, Germany (USAFE).

•Outstanding food services manager — Capt James A. Mitchell, 834th Services Sq, Hurlburt Field, Fla. (TAC).

•Outstanding senior services manager of the year — Lt Col Larry Whiting, formerly Keesler AFB, Miss. (ATC), now assigned to 9th AF, Shaw AFB, S.C.

•First presentation of the USAF Inkeeper award — Capt Richard Doucette, 6570th ABG, Brooks AFB, Tex. (AFSC).

•Bordner Awards — Castle AFB, Calif. (SAC), central heating plant with a capacity between 3.5-14 million BTU/hour; Pease AFB, N.H. (SAC), central heating plant capacity 14 million BTU plus; 2113th Communications Sq (Location Alpha), Martina Franca, Italy, (USAFE) power generation plant, 100-2,000 KW; 401 CES, Torrejon AB, Spain (USAFE), power generation, 2000 KW-plus.

(See "Winning Efforts," pp 42-44.)

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